THE ATHENÆUM

Journal of English and Foreign Literature, Science, and the Fine Arts.

No. 1189. LONDON, SATURDAY, AUGUST 10, 1850. PRICE FOURPENCE Stamped Edition, 5d.

For the convenience of Subscribers residing in remote places, the weekly numbers are reissued in Monthly Parts, stitched in a wrapper, and forwarded with the Magazines.—Subscriptions for the Stamped Edition for the Continent, for not less than Three Months, and in advance, are received by M. BAUDRY, 3, Quai Malaquais, Paris, or at the Publishing Office, 14, Wellington-street North, Strand, London. For France and other Countries not requiring the postage to be paid in London, 28 fr. or 1l. 2s. the year. To other Countries, the postage in addition.

[JAMES HOLMES, TOOK'S COURT, CHANCERY LANE.

WILLIAM WORDSWORTH.

At a MEETING, held at the House of Mr. JUSTICE COLERIDGE, on Monday, the 13th of May,—

The LORD BISHOP OF LONDON in the Chair,—

It was Resolved,—

That a Subscription be raised to do honour to the Memory of WILLIAM WORDSWORTH, and that a Committee be appointed to carry this object into effect.

The Committee having met at the same place, on the 10th of June,—

A. J. B. HOPE, Esq. M.P. in the Chair,—

It was Resolved,—

That the objects of the Subscription be

I. To place a whole-length effigy of Wordsworth in Westminster Abbey.

II. If possible, to erect some Monument to his Memory in the neighbourhood of Grasmere, Westmorland.

Committee.

THE LORD BISHOP OF LONDON, Chairman.

His Grace the Duke of Argyll.	Copley Fielding, Esq.
The Chevalier Bunsen.	T. H. Farrer, Esq.
The Lord John Manners, M.P.	Rev. Canon Fisher, Salisbury.
The Lord Lindsay.	Ven. Archdeacon Hare.
The Lord Bishop of St. David's.	Sir William Hamilton, Dublin.
The Lord Bishop of Oxford.	Benson Harrison, Esq.
The Lord Lyttelton.	Rev. W. Harness.
The Lord Monteagle.	A. J. B. Hope, Esq. M.P.
The Right Hon. W. E. Gladstone, M.P.	Rev. Joseph Hunter.
The Right Hon. Sir James Stephen, K.C.B.	Rev. John Keble.
The Hon. R. Cavendish.	Sir Edwin Landseer, R.A.
The Hon. S. Spring Rice.	John G. Lockhart, Esq.
The Hon. Mr. Justice Coleridge.	W. C. Macready, Esq.
The Hon. Mr. Baron Rolfe.	James Marshall, Esq. M.P.
The Hon. Mr. Justice Talfourd.	William Marshall, Esq. M.P.
Sir Archibald Edmonstone, Bart.	Herman Merivale, Esq.
Sir Robert H. Inglis, Bart. M.P.	Edward Moxon, Esq.
Sir F. H. Doyle, Bart.	Rev. Thomas Madge.
Sir Benjamin Brodie, Bart.	Rev. F. D. Maurice.
The Very Rev. the Dean of St. Paul's.	R. Monckton Milnes, Esq. M.P.
The Rev. the Master of Trinity.	Professor Owen.
The Rev. the Master of St. John's.	Roundell Palmer, Esq. Q.C. M.P.
The Rev. the Master of Peterhouse.	George Richmond, Esq.
The Rev. the Master of Downing.	H. Crabb Robinson, Esq.
T. D. Acland, Esq.	Samuel Rogers, Esq.
H. W. Acland, Esq. M.D.	John Ruskin, Esq.
Matthew Arnold, Esq.	Professor Scott.
W. Butterfield, Esq.	Rev. C. Cuthbert Southey.
Rev. W. Bruce Cunningham.	James Spedding, Esq.
W. Strickland Cookson, Esq.	Rev. Arthur P. Stanley, University College, Oxford.
Kenelm Digby, Esq.	A. Stafford, Esq. M.P.
Rev. Dr. Donaldson.	Sir John Stoddart. Knt. L.L.D.
Rev. Nicholas Darnell, Stanhope.	Rev. Alfred Strettell.
John Davy, Esq. M.D.	Henry Taylor, Esq.
Philip B. Duncan, Esq.	R. Twining, Esq.
W. Dyce, Esq. R.A.	Ven. Archdeacon Thorp, Kemerton.
C. L. Eastlake, Esq. R.A.	Alfred Tennyson, Esq.
Frederick Elliott, Esq.	Thomas Thorpe, Esq. Alnwick.
	Rev. B. C. Trench.
	Aubrey de Vere, Esq.
	Professor Wilson.
	Charles Young, Esq.

The Committee appointed the following gentlemen a Sub-Committee, with power to add to their number, to superintend and carry on the details.

The Lord Bishop of St. David's.	A. J. B. Hope, Esq. M.P.
The Hon. Mr. Justice Coleridge.	W. C. Macready, Esq.
The Ven. Archdeacon Hare.	George Richmond, Esq.
W. Butterfield, Esq.	H. Crabb Robinson, Esq.
W. Strickland Cookson, Esq.	John Ruskin, Esq.
W. Dyce, Esq. R.A.	James Spedding, Esq.
C. L. Eastlake, Esq. R.A.	Henry Taylor, Esq.
Copley Fielding, Esq.	

WILLIAM BOXALL, Esq., 14, Welbeck-street, Cavendish-square, and JOHN DUKE COLERIDGE, Esq., 26, Park-crescent, have consented to act as Secretaries; to whom all communications may be addressed.

Subscriptions will be received by the Secretaries, and at Messrs. Herries, Farquhar & Co., 16, St. James's-street; Messrs. Hoare & Co., Fleet-street; Messrs. Twining, 215, Strand; Messrs. Barnard & Dimsdale, 50, Cornhill; Mr. Moxon, Publisher, 44, Dover-street. Also by Messrs. Macmillan, Booksellers, Cambridge; Mr. J. H. Parker, Bookseller, Oxford; and Mr. Simms, 16, St. Anne's-square, Manchester, who have consented to act as Local Secretaries.

List of Subscriptions.

HER MAJESTY THE QUEEN and H.R.H. THE PRINCE ALBERT £50 0 0

The Marquis of Lansdowne, K.G. £10 0	Mrs. Arnold £5 5
The Earl of Lonsdale 10 0	Dr. Arnott 1 1
The Earl of Carlisle 5 0	Benjamin Austen, Esq. .. 2 2
The Earl of Ellesmere 5 0	Mrs. Bayne 10 0
Viscount and Viscountess Ashford. 10 0	Miss Beddoes 2 0
Lord Lindsay 10 10	Messrs Beever 1 0
The Bishop of London 25 0	Dr. Blair 5 0
The Bishop of St. David's 20 0	Rev. John Bolland 2 2
Lord Monteagle 5 0	W. Boxall, Esq. 1 1
Lady Monteagle 5 0	Messrs. Bradbury & Evans 1 1
The late Right Hon. Sir Robert Peel, Bart. 10 0	B. Brodie, Esq. 1 1
Right Hon. W. E. Gladstone, M.P. 10 0	Meredith Brown, Esq. 5 0
Hon. S. Spring Rice 5 0	Walter Buchanan, Esq. .. 1 1
Hon. R. Cavendish 5 0	Robert Buck, Esq. 2 2
Hon. and Rev. R. C. Boyle 1 1	Samuel Buck, Esq. 2 2
Hon. Col. Lowther 5 0	W. Butterfield, Esq. 2 2
Hon. Lieut.-Col. Leicester 5 0	W. G. Clark, Esq. 1 1
Hon. E. T. B. Twisleton 10 0	Mrs. Clarkson 5 5
Mr. Justice Coleridge 10 0	Mrs. Henry N. Coleridge.. 3 3
Lady Coleridge 2 0	J. D. Coleridge, Esq. 1 1
Mr. Justice Talfourd 10 0	J. C. Colquhoun, Esq. 2 0
Lady Cullum 10 0	P. Cumin, Esq. 0 10
Lady Richardson 2 0	Rev. H. W. Cookson, D.D. 10 0
Sir Archibald Edmonstone, Bart. 1 1	Strickland Cookson, Esq. 10 0
Sir R. H. Inglis, Bart. M.P. 2 0	Rev. W. Bruce Cunningham 1 1
Sir George Beaumont, Bart. 5 0	Rev. Henry Curwen 1 1
Sir Ben. Brodie, Bart. 5 0	Henry Curwen, Esq. 5 5
Lady Brodie 1 1	Mrs. Curwen 1 1
Sir Edward North Buxton, Bart. M.P. 2 2	Miss Curwen 1 1
Major-Gen. Sir Ch. Pasley 5 0	Edw. Stanley Curwen, Esq. 1 1
Sir John Stoddart 5 5	W. Blamire Curwen, Esq. 1 1
T. D. Acland, Esq. 2 2	Rev. N. Darnell 20 0
Mrs. Alexander 1 1	J. L. C. Davies, Esq. 1 1
Miss Allen 1 1	Dr. Davy 5 0
J. Hughes Anderdon, Esq. 1 1	Henry Denton, Esq. 1 1
M. Arnold, Esq. 2 2	Joseph C. Dimsdale, Esq. 1 1
	Mrs. J. C. Dimsdale 1 1
	J. B. Donne, Esq. 1 1
	Thomas Dudley, Esq. 1 1
	P. B. Duncan, Esq. 10 0

Subscriptions continued.—

W. Dyce, Esq. R.A. .... £ 1 1	J. P. Muirhead, Esq. £1 1
C. L. Eastlake, Esq. R.A... 1 1	Rev. Fred. and Mrs. Myers 5 0
E. M. 1 1	James Newton, Esq. 1 1
T. H. Farrer, Esq. 1 1	Geo. S. Nicholson, Esq. .. 1 1
W. J. Farrer, Esq. 1 1	Miss Nicholson 1 1
Edwin W. Field, Esq. 1 1	Edmund Oldfield, Esq. 1 1
Copley Fielding, Esq. 5 0	Roundell Palmer, Esq. M.P. 5 0
Mrs. Fletcher 5 0	Robert George Parnther, Esq. 3 3
A Friend 10 0	Frederick Peel, Esq. M.P. 5 0
Miss Fussell 1 1	Edmund Peel, Esq. 1 1
John Gibbons, Esq. 5 0	John Penn, Esq. 1 1
F. W. Gibbs, Esq. 1 1	Rev. J. H. Pindar 2 0
John Gibson, Esq. R.A. .. 1 1	Mrs. Pollard 5 0
Rev. R. P. Graves 2 2	W. F. Pollock 1 1
Archdeacon Hare 10 0	Mrs. W. F. Pollock 1 1
Mrs. Julius Hare 1 1	William Powell, Esq. 1 1
Rev. W. Harness 3 3	Mrs. Powell 1 1
Benson Harrison, Esq. .. 5 0	Master Powell 1 1
Benson Harrison, Esq. jun. 5 0	Miss Powell 1 1
Matthew Harrison, Esq... 5 0	R. R. Redmayne, Esq. 1 1
Richard Harrison, Esq. .. 5 0	Henry Reeve, Esq. 1 1
Wordsworth Harrison, Esq. 5 0	George Richmond, Esq. 1 1
J. A. Hart, Esq. 1 1	Mrs. Ricketts 1 1
Arthur H. Heywood, Esq. 5 0	H. Crabb Robinson, Esq. .. 20 0
Mrs. Hickman 1 1	Thomas Robinson, Esq. 2 2
Mrs. Hoare (Hampstead).. 10 0	Samuel Rogers, Esq. 25 0
Mrs. Sarah Hoare (ditto) 10 0	John Ruskin, Esq. 5 0
Mrs. George Holbeck 1 1	H. R. Sandbach, Esq. 1 1
A. J. B. Hope, Esq. M.P. 10 0	Mrs. H. R. Sandbach 1 1
Rev. James J. Hornby.... 5 0	John Scott, Esq. 1 1
R. Horne, Esq. 1 0	Professor Sedgwick 5 0
Wren Hoskyns, Esq. 1 1	J. C. Shairp, Esq. 2 2
Mrs. W. Hoskyns 1 1	M. A. Sharp, Esq. 1 0
Rev. W. G. Humphreys .. 1 1	Rev. Morton Shaw 1 1
Rev. Joseph Hunter 1 1	George Simms, Esq. 1 1
Mrs. Huskisson 5 0	W. Smyth, Esq. 1 1
Rev. Dr. Hymers 5 0	James Spedding, Esq. 5 0
R. J. Ingham, Esq. 1 1	A. Stafford, Esq. M.P. 5 0
Miss James 1 0	Rev. A. P. Stanley 5 0
H. R. Vaughan Johnson, Esq. 1 1	Mrs. Sykes 1 1
William Johnston, Esq. .. 2 2	Rev. A. Tatham 1 1
John Kenyon, Esq. 25 0	Henry Taylor, Esq. 10 0
George H. Kinderley, Esq. 1 1	Wm. M. Thackeray, Esq. .. 1 1
Rev. Charles Kingsley, jun. 1 1	Thomas Thompson 5 0
Thomas Landseer, Esq. 1 1	Rev. W. H. Thompson 1 1
Rev. J. C. Laprimaudaye 2 2	Miss Todhunter 1 1
Austen H. Layard, Esq. .. 2 2	Henry Tremenheere, Esq. 3 3
J. G. Lockhart, Esq. 5 0	Rev. R. C. Trench 3 3
James Lockhart, Esq. jun. 1 1	R. Twining, Esq. 10 0
James J. Maberly, Esq. ... 1 1	J. F. Twisden, Esq. 1 1
Joseph Maberly, Esq. 1 1	Aubrey de Vere, Esq. 3 0
W. C. Macready, Esq. 3 3	Rev. George Wagner 1 1
Rev. Thomas Madge 1 1	Miss Wagner 1 1
Mrs. Maltby 1 1	Miss Emily Wagner 1 1
Wm. Marshall, Esq. M.P. 10 0	John Wainewright, Esq... 1 1
J. G. Marshall, Esq. M.P. 10 0	Rob. A. Wainewright, Esq. 1 1
Arthur Marshall, Esq. 5 0	Thomas P. Warren, Esq... 1 1
H. C. Marshall, Esq. 5 0	Mrs. Watson 1 1
Hon. Mrs. H. C. Marshall 5 0	Miss Watson 1 1
Miss E. Marshall 5 0	Miss M'Watson 1 1
Rev. F. D. Maurice 10 0	Miss Watts 1 1
Rev. M. Maurice 1 1	R. Westmacott, Esq. R.A. 1 1
H. Merivale, Esq. 1 1	Rev. Dr. Whewell 10 0
Rev. T. E. Miller 1 1	Rev. H. W. Wilberforce.... 1 1
Rev. J. Miller 1 1	Rev. M. Wilkinson 1 1
Rev. John Miller 1 1	E. N. Winstanley, Esq. 1 1
Miss Miller 1 1	W. Page Wood, Esq. M.P. 5 0
Alexander Mitchell, Esq. 1 1	Rev. Dr. Worsley 5 5
Mrs. Mitchell 1 1	T. H. Wyatt, Esq. 1 1
Edward Moxon, Esq. 10 0	Charles Young, Esq. 1 1
Mrs. Moxon 1 1	

NEW WORKS.

1.

THE VICTORIA REGINA: beautifully illustrated with Plates by Mr. FITCH, from the specimens now in flower at Syon House and Kew Gardens. The Descriptions by Sir W. J. HOOKER, F.R.S. Large imperial folio, 21s.

[Preparing for Publication.

*** As only a limited number will be printed, parties desirous of having the work are requested to send their Names to the Publishers. The copies will be delivered strictly in the order of subscription.

2.

INSTINCT and REASON. By ALFRED SMEE, F.R.S., Author of 'Electro-Biology.' 8vo. With coloured Plates by WING, and Woodcuts. 18s.

3.

The TOURIST'S FLORA. A Descriptive Catalogue of the Flowering Plants and Ferns of the British Islands, France, Germany, Switzerland, Italy, and the Italian Islands. By JOSEPH WOODS, F.A.S. F.L.S. F.G.S. 8vo. 18s.

4.

VOICES from the WOODLANDS; or, HISTORY of FOREST TREES, LICHENS, MOSSES, and FERNS. By MARY ROBERTS. With 20 coloured Plates, by FITCH. Royal 16mo. 10s. 6d.

5.

Popular HISTORY of MAMMALIA. By ADAM WHITE, F.L.S., Assistant in the Zoological Department of the British Museum. With 16 coloured Plates of Quadrupeds, &c. by B. WATERHOUSE HAWKINS, F.L.S. Royal 16mo. 10s. 6d.

6.

Popular HISTORY of BRITISH SEA-WEEDS. By the Rev. DAVID LANDSBOROUGH, A.L.S. Royal 16mo. With 22 Plates of Figures, by FITCH. 10s. 6d. coloured.

7.

Popular BRITISH ORNITHOLOGY. By P. H. GOSSE. Royal 16mo. With 20 Plates of Figures. 7s. plain; 10s. 6d. coloured.

8.

Popular BRITISH ENTOMOLOGY. By MARIA E. CATLOW. Royal 16mo. With 16 Plates of Figures, by WING. 7s. plain; 10s. 6d. coloured.

9.

Popular FIELD BOTANY. By AGNES CATLOW. *Second Edition.* Revised by the Author. Royal 16mo. With 20 Plates of Figures. 10s. 6d. coloured.

10.

EPISODES of INSECT LIFE. *Second Series.* Crown 8vo. Beautifully illustrated and bound, 16s. Coloured and bound extra, gilt edges, 21s.

11.

PANTHEA, the SPIRIT of NATURE. By ROBERT HUNT, Author of 'The Poetry of Science.' 8vo. 10s. 6d.

12.

The POETRY of SCIENCE; or, STUDIES of the PHYSICAL PHENOMENA of NATURE. By ROBERT HUNT. *Second Edition.* Revised by the Author. With an Index. 8vo. 12s.

13.

The BIRDS of IRELAND. Vol. II. By WILLIAM THOMPSON, Esq., Pres. Nat. Hist. and Phil. Soc. of Belfast. 8vo. 12s.

14.

RHODODENDRONS of SIKKIM-HIMALAYA. *Second Edition.* With coloured Drawings and Descriptions made on the spot. By Dr. JOSEPH D. HOOKER, F.R.S. Edited by Sir W. J. HOOKER, F.R.S. Handsome imperial folio, containing 10 beautifully coloured Plates. 21s.

15.

TRAVELS in the INTERIOR of BRAZIL, principally through the GOLD and DIAMOND DISTRICTS. By GEORGE GARDNER, M.D. F.L.S. *Second Edition.* 8vo. Plate and Map. 12s.

16.

THOUGHTS on a PEBBLE; or, a FIRST LESSON in GEOLOGY. By Dr. MANTELL, F.R.S. *Eighth Edition.* Considerably enlarged, with 4 coloured Plates, 23 Woodcuts, and Portrait. 5s.

REEVE AND BENHAM,
5, Henrietta-street, Covent-garden.

NEW WORK BY MRS. JAMESON.

Just published, in 1 vol. square crown 8vo. illustrated with 11 Etchings by the Author and 84 Woodcuts, price 28s. cloth,

LEGENDS of the MONASTIC ORDERS, as represented in the Fine Arts. Forming the Second Series of 'Sacred and Legendary Art.' By Mrs. JAMESON.

Also, by Mrs. Jameson, nearly ready,

SACRED and LEGENDARY ART. First Series. Illustrated with Sixteen Etchings by the Author, and numerous Woodcuts. New Edition, in One Volume.

London: Longman, Brown, Green, and Longmans.

THIRD SERIES.

Just published, in One very large Volume of 850 pages, double columns; square crown 8vo. price One Guinea,

SOUTHEY'S COMMONPLACE-BOOK. Edited by Mr. Southey's Son-in-Law, the Rev. JOHN WOOD WARTER, B.D. THIRD SERIES, being ANALYTICAL READINGS, and forming a Volume complete in itself.

THE CONTENTS COMPRISE ANALYTICAL READINGS, WITH ILLUSTRATIONS AND COPIOUS EXTRACTS, OF WORKS IN

1. English Civil History;
2. English Ecclesiastical History;
3. Anglo-Irish History;
4. French History;
5. French Literature;
6. Miscellaneous Foreign Civil History;
7. General Ecclesiastical History;
8. Historical Memoirs;
9. Ecclesiastical Biography;
10. Miscellaneous Biography;
11. Correspondence;
12. Voyages and Travels;
13. Topography;
14. Natural History;
15. Divinity;
16. Literary History;
17. Miscellaneous Literature; and
18. Miscellanies.

By the same Editor, uniform with the above,

SOUTHEY'S COMMONPLACE-BOOK. FIRST SERIES—CHOICE PASSAGES. New Edition, price 18s.

SOUTHEY'S COMMONPLACE-BOOK. SECOND SERIES—SPECIAL COLLECTIONS. Price 18s.

*** The FOURTH and concluding SERIES—comprising ORIGINAL MEMORANDA, Literary and Miscellaneous, accumulated by Mr. Southey in the whole course of his personal and literary career—is now in the press.

London: Longman, Brown, Green, and Longmans.

Just published, in 1 vol. 12mo. price 3s. 6d. cloth,

A COMPENDIUM of UNIVERSAL HISTORY, from the Creation to the Present Time. Translated from the 24th Edition of the German Original. By CHARLES THEOMARTYR STAFFORD.

*** This volume is a literal translation of a German work of great celebrity, carefully revised by a Clergyman of the Church of England; with the addition of a few interesting extracts and anecdotes.

London: Longman, Brown, Green, and Longmans.

HILEY'S ENGLISH EXERCISES AND GRAMMAR.

New Edition, in 12mo. price 2s. 6d. cloth,

EXERCISES adapted to HILEY'S ENGLISH GRAMMAR; progressively arranged, and divided into appropriate Lessons: with the principal Rules briefly expressed. By RICHARD HILEY, Principal of the Leeds Classical and Commercial School; and Author of various elementary Educational Works, a List of which may be obtained of Messrs. Longman and Co. Fourth Edition, considerably improved.

Also, 4th Edition, revised, 12mo. price 3s. 6d.

HILEY'S ENGLISH GRAMMAR, STYLE, RHETORIC, and POETRY: To which are added, Preparatory Logic; and, Advice to the Student on the Improvement of the Understanding.

London: Longman, Brown, Green, and Longmans.

QUESTIONS ON S. HALL'S FIRST ATLAS.

Just published, in 12mo. price 2s. cloth,

QUESTIONS adapted to S. HALL'S FIRST or ELEMENTARY ATLAS. For the use of Schools. Compiled by THOMAS BOWMAN, B.A., late Head Master of the Cheltenham New Proprietary School.—Also,

A FIRST or ELEMENTARY ATLAS, for the use of Schools: containing Ten Maps, engraved by S. HALL. New Edition. Oblong 4to. price 1s. 6d. coloured; or each Map separately, price Twopence.—Also,

MAP PROJECTIONS adapted to S. HALL'S FIRST or ELEMENTARY ATLAS, for the use of Schools. Intended to be filled up and coloured by the Pupils. Engraved by S. HALL. Oblong 4to. price One Shilling, sewed; or each Projection separately, price One Penny.

London: Longman, Brown, Green, and Longmans.

UNIFORM WITH LIDDELL AND SCOTT'S LEXICON.

Just published, in 1 vol. post 4to. price 21s. cloth,

A NEW ENGLISH-GREEK LEXICON; containing all the Greek Words used by Writers of good authority; citing the Authorities for every Word; explaining the irregular Constructions, Declensions, and Conjugations; and marking the doubtful Quantities. By C. D. YONGE, B.A.

EXERCISES in GREEK PROSE COMPOSITION. For the use of Eton, Winchester, Harrow, and King's College, London. 12mo. 5s. 6d. cloth.

By the same Author, post 8vo. price 9s. bound,

A NEW LATIN GRADUS AD PARNASSUM; containing every Word used by the Poets of good authority. For the use of

Eton, Westminster, Winchester, Harrow, and Charterhouse Schools. | King's College, London, and Marlborough College.

EXERCISES in LATIN PROSE COMPOSITION. For the use of Eton, Winchester, Westminster, Harrow, and King's College, London. 12mo. 5s. 6d. cloth.

12mo. price 4s. 6d.

EXERCISES for VERSES out of 'OWN SENSE.' Used at Eton.

London: Longman, Brown, Green, and Longmans.

MR. BENTLEY'S NEW WORKS

To be published in AUGUST.

I.

LONDON and its CELEBRITIES. A SECOND SERIES of LITERARY and HISTORICAL MEMORIALS of LONDON. By J. HENEAGE JESSE, Esq., Author of 'England under the Court of the Stuarts,' &c. 2 vols. 8vo.

II.

A PILGRIMAGE to the LAND of my FATHERS; or, NARRATIVE of TRAVEL and SOJOURN in JUDEA and EGYPT. By the Rev. MOSES MARGOLIOUTH. 2 vols. 8vo. with numerous Illustrations.

III.

THE BERBER; or, the SALEY PIRATES. A TALE OF MOROCCO. By Dr. MAYO. Post 8vo.

IV.

ESCAPE of HIS MAJESTY KING LOUIS PHILIPPE, from HONFLEUR to HAVRE. By the COUNT D'HOUDETOT. With an Illustration. 8vo.

V.

THE BROTHERS. A ROMANCE FROM THE GERMAN. 2 vols.

VI.

LYNCH'S EXPEDITION to the DEAD SEA. New Edition, royal 8vo. 21s. Plates.

[Now ready.

VII.

LIFE in AUSTRIA and HUNGARY. From the German. By MARY NORMAN. 3 vols. post 8vo.

VIII.

CAPT. MARRYAT'S SEA STORIES.

In fcap. 8vo. vols. neatly bound, price 3s. 6d. with Illustrations.

[New Editions, now ready.

1. PETER SIMPLE.
2. JACOB FAITHFUL.
3. JAPHET IN SEARCH OF A FATHER.
4. KING'S OWN.
5. MIDSHIPMAN EASY.
6. NEWTON FORSTER.
7. THE PACHA OF MANY TALES.
8. THE POACHER.
9. THE PHANTOM SHIP.
10. THE DOG FIEND.
11. PERCIVAL KEENE.

Also, Edited by Capt. MARRYAT,

12. RATTLIN THE REEFER.

IX.

POPULAR EDITION OF PRESCOTT'S HISTORICAL WORKS.

Now ready, in crown 8vo. volumes, handsomely bound, price 6s. each,

PRESCOTT'S HISTORICAL WORKS.

[Now ready.

1.

THE REIGN OF FERDINAND AND ISABELLA.
Three Volumes, 18s.

2.

THE CONQUEST OF MEXICO.
Three Volumes, 18s.

3.

THE CONQUEST OF PERU.
Three Volumes, 18s.

*** Any Volume can be had separately, price 6s.

The Octavo Edition, illustrated and handsomely bound, can still be obtained.

RICHARD BENTLEY, New Burlington-street,
(Publisher in Ordinary to Her Majesty).

LONDON, SATURDAY, AUGUST 10, 1850.

REVIEWS

The History of the Papal States, from their Origin to the Present Day. By the Rev. John Miley, D.D., Author of 'Rome under Paganism and the Popes.' 3 vols. Newby.

In a very long and very unnecessary Preface, the author of this book tells us that it is an attempt to supply what has been hitherto a desideratum in European literature. "Histories of the Roman Catholic Church," he says, "there are, of all sorts, in every dialect and in every form;" and, though there is still no perfect history of the Popes, yet "the series of Papal biographies may also be regarded as tolerably complete." But "a history of that region of Central Italy—of that realm over which the Popes have swayed the sceptre for more than a thousand years,—one may search for in vain. In no language, dead or living,—in no shape, whether as a consecutive narrative or as a digest of materials,—under no title, is any such work to be met with." Again, a few lines further on, he says, "Let the question be put to the most eminent bibliopolists of London, Paris, Vienna, Rome,—their answer will be, there is no such book as a History of the Papal States. Make the round of the great libraries, from the British Museum to the Vatican, the answer will be still the same."

After such a flourish of trumpets, we naturally expect something valuable. Nor does the author promise little. Though presenting his volumes to the public "with a most oppressive sense of their faults and defects,"—and though conscious that he possesses "no magic wand that, on a sudden, could metamorphose a howling wilderness into a paradise,"—he yet believes that "he has done a good deal in the way of those preliminaries without which the genius even of a Michael Angelo could not proceed with a superstructure. The foundations of the history he has excavated thoroughly: he flatters himself he has made some approximation to the proper plan. That (beginning in the Catacombs and closing with the Earl Mount-Edgcumbe's pamphlet) he has searched up, collected, sifted, and reduced to something like order and appropriate grouping an immense mass of solid, authentic materials, he has no shadow of doubt whatever." This good opinion of his book, so very modestly drummed into the reader by the author at the outset, (and we think it was very prudent of him to do it there, seeing that it would have been more difficult for him to obtain belief for the same statement at the close,) is somewhat shaken, however, by a candid announcement made in the Preface itself as to the manner in which the book was composed.—

"Happening [he says] to be at Rome in the year 1833, for the recovery of his health, he occupied his leisure with some studies and researches as to the contrasts and reciprocal relations of Rome under Paganism and under the Popes. In the course of these studies he became sensible of the deficiency referred to; and although the idea of attempting to supply it did not for a moment so much as cross his mind, and was never seriously thought of by him until a very recent period, nevertheless, such odds and ends of leisure as the active duties of a missionary career in Ireland left within his reach were from that time to the present so assiduously devoted in investigating the sources of what he ever regarded as a branch of the human annals as momentous as it is extraordinary, that when he was prompted by recent events in Rome to actually set foot, in the way of composition, on the untrodden region, he found that his materials—in the form of notes, and extracts, and sketches—had so accumulated for the entire cycle of two thousand years, that the chief difficulty to be contended with in the attempt to execute his task was, not to discover materials for his book, but to compress those he had ready at hand into something of a reasonable compass."

In the actual composition of the book, however, it seems he laboured under "many and singular disadvantages." Of these, he will "obtrude only one on the attention of his readers;" to wit, that "at the outset he found himself in this dilemma—either to commit to the flames the notes from which these volumes have been written, or to complete the task of composition within six months." What special combination of circumstances it was that gave rise to this cruel dilemma, he does not inform us, farther than by hinting that the fact of his being one of those that were "drawn most deeply into the hideous vortex of misery during the Irish famine of 1849," had something to do with it. The first volume, it appears, was already finished when that terrible calamity occurred; then, for two months, during which he had to give his mind to other and more harassing occupations, the work of composition was interrupted. The second volume was commenced, however, "on the 15th of August 1849; and, until the postscript of the third was written, on the 15th of January 1850, the author's pastime consisted, exclusively, in the transition from the process of arranging his notes in something like a rude narrative to that very entertaining process of correcting the press."

We call attention so particularly to these gratuitous communications of Dr. Miley respecting the gestation of his book, partly because they are themselves characteristic,—the same boastful and egotistic style being kept up, under another guise, throughout the work; partly because it is purely on account of its being one of the most flagrant examples of literary delinquency we have ever met with,—and not on account of its special merits or demerits as a 'History of the Papal States,' that we have resolved to notice the book at all.

And, first, we think our readers will agree with us that the public can take no cognizance of such excuses for bad or imperfect literary workmanship as that offered by Dr. Miley. There are cases, indeed,—as, for instance, in the preparation of an official Report on any sudden emergency,—where the public may allow for faults or defects occasioned by hurry; but it is not so with a literary composition, properly so called. What the public demands is a good book. It cares nothing about the methods by which an author may have proceeded in his attempt to supply this want,—nothing about the obstacles he may have had to encounter. These are his own business; and it is to be considered that every author has settled with himself whether his opportunities have been sufficient for his purpose before he produces his book for public inspection at all. How fast he had to write it,—how he was interrupted by illness, by domestic affliction, or by other occupations,—how the printer dogged him at the heels,—all these are matters that may be interesting to his private friends, and may render them indulgent in their criticisms: but to the plea of hurry as a ground for lenient judgment, the public is, and ought to be, sternly deaf.—There was no vehement necessity why Dr. Miley's book should exist: there was no particular mundane or national clamour for it,—as there was some time ago for a Report on Cholera from the Board of Health. There was nothing to make it incumbent on Dr. Miley to take such very vigorous measures with himself in the process of getting it up. The public could very well have waited his leisure. In short, in the dilemma in which Dr. Miley says he was placed last year, of committing his notes to the flames or completing the task of composition within six months, we greatly fear that he selected the selfish instead of the philanthropic alternative.

At first, while reading the author's Preface, we were led, notwithstanding the somewhat offensive egotism to which we have already alluded, to conceive a prepossession in his favour; occasioned in part, it may be, by the very strength of his apparent self-confidence,—but more especially, we think, by our liking for the plan of his work as clumsily pre-announced by him, though still in language indicating some theoretic sense of its merits. As this is really the best thing we have discovered in the whole book, we think it fair to give Dr. Miley the full benefit of it. The following are the passages referred to.—

"An idea sufficiently clear and comprehensive, with respect to the author's mode of viewing his subject, may be conveyed in a very few words, on each of its two great constituent features, viz., the theatre of the events, and the drama which these events compose. And, first, as to the theatre of the events: we have not hesitated to lay great stress on the description of it, in its entire extent, and in great detail. We have endeavoured, in short, to place it in every light that we thought could help the reader to feel himself perfectly at home in the territory, and to carry with him, throughout, a conception as vivid and truthful as possible of the scenery and other accessory circumstances of peculiarity, in the midst of which the historic actions and occurrences take place. * * For, if it be at all a legitimate object of history,—as it most undoubtedly is a lofty and important object,—in some sort to reproduce the successive generations, events, and revolutions of which it treats, and cause them once more, with as much as possible of life-like circumstance, to pass before the imagination of the reader, how is this effect to be obtained, if the *dramatis personæ* are introduced on any sort of platform, no matter how commonplace, without heeding in the least whether the scenery harmonize or be at variance with the characters that play their parts? * * From the scenery, we pass to the drama itself; and of this it is sufficient to observe, that, disengaging ourselves at the outset from a labyrinth of what we can only regard as technical litigation, with reference to the precise instant at which the Popes became temporal sovereigns, we trace the tide of this dominion at once to its fountain-head; and in viewing it in its after developement, we have endeavoured to throw ourselves into the centre of each of the great epochs or cycles into which its career, on being fully considered, is found to divide itself; and then, by grouping the figures and transactions round that centre, endeavour thus to bring the reader acquainted not only with the annals of this realm from century to century, or from cycle to cycle, but also to picture each epoch as to its own characteristic identity, without losing sight of the unity and harmonious relations pervading the entire plot, and combining all the separate cycles like so many acts of the same drama."

Now this is a fair promise. A work prepared according to this plan would be a really good history of the Papal States.

But when we come to look at the execution—when we turn from Dr. Miley's boastful preface to the body of the work—our feeling of disappointment is the greater for our previous disposition to indulgence. The topographical survey of the Papal States, indeed, wherein, according to promise, Dr. Miley lays out the theatre of his intended History, we might allow to pass as a tolerably compiled repertory of facts relative to the central parts of Italy; though even here there is reason to complain of the unnecessary length of the survey for the purposes of the book (it occupies no fewer than 185 pages)—as well as of the total want of pictorial power displayed in the grouping of the facts, and the total absence of that perception of the interesting or characteristic in topographical details by which alone such surveys are pre-

vented from being mere wearisome trash. But it is in the history itself, in the pretended evolution of the great drama of the Papal fortunes, act after act,—or, as the author expresses it in his own big language, "from century to century" and "from cycle to cycle,"—that the worthlessness of the book and the hollowness of the author's professions begin to be distinctly seen.—If it was a history of the Papal States that Dr. Miley intended to write, the intention must have slipped out of his mind almost as soon as he began to put it in execution. The history of the Papal States that we were entitled to expect from Dr. Miley, should have been a distinct narrative, in the first place, of the fortunes and social progress of that portion of Central Italy of which the Popes had become possessors; and in the next place of the gradual developement of the theory of the Papacy itself in its relations with those States, as well as, through them, with the rest of the world. Nothing of this kind do we get from Dr. Miley. What we have instead is a collection of all kinds of odds and ends,—topographical, bibliographical, antiquarian, and ecclesiastical,—thrown together without care or order, and hardly even with sense,—and connected merely by this one circumstance, that they all do bear some reference or other to the Papacy or to Papal Rome. We have anecdotes and jejune sketches of the Popes, accounts of buildings in Rome, allusions to the state of the world everywhere, lists of the bishops who were present at certain ceremonies and processions, extracts without end from all kinds of books,—a few from old and original authorities, but the greater number from the most patent and accessible of modern writers, such as Robertson, Guizot, Gibbon, Sismondi, Ranke, Macaulay, Mariotti, Bulwer, Sir James Stephen, &c. &c.; and, in the midst of all this, an occasional piece of declamation, in the style that Sir Walter Scott used to name *bow-wow*, from the author's own pen.

We cannot give a truer idea of the book than by saying that it appears to consist of the vapid contents of an ill-kept note-book emptied out into three printed volumes. The typographical appearance of the pages themselves, especially in the last two volumes, betrays this. Instead of a continuous text in which information is bedded or woven forth in an orderly manner by a painstaking author, we have mere loose paragraphs of miscellaneous rubbish put down any how, and often separated from each other, as in a note-book, by black lines drawn across the page. Nor is it as if the author, oppressed by the magnitude of the subject, and perceiving that the work of artistically combining his materials into a fluent narrative would—as in Gibbon's case—be a work of many years, had determined simply to present the materials themselves, so as to suggest reflections of value in the mean time, and render the task of the future historian easier. Even in this case it would have been a gross misnomer to entitle the book 'A History of the Papal States':—still, as an accumulation of materials, it might have been worth something. But here we have no accumulation of materials capable of serving the slightest useful end. That Dr. Miley has "begun in the Catacombs and closed with the Earl Mount-Edgcumbe's pamphlet" is true enough; but that his route between these two points has been through "an immense mass of solid authentic materials" is a pure declaration of the author's own. In contradiction to it, we would set up the declaration, that it has simply been through an old book or two, and a few modern popular essays:—and, through these, with a very moderate share of culture or intelligence.

In the first volume, indeed, there is a kind of attempt to illustrate, or rather to assert that common and very probable theory of the origin of the temporal Papacy, which traces it to the spontaneous deposition of power from all sides in the hands of the successors of St. Peter; but after clearing this little portion of his task, the author breaks away into every possible manifestation of a mere propensity to book-stuffing. Hopping, as it were, along the series of Popes, and picking up in connexion with each any morsel of raw information that offers itself,—such, for example, as the fact of Charlemagne's influence on the Papacy in the ninth, and the anti-papal efforts of the Cenci and others in the tenth century,—he hastens clamorously on to the age of Hildebrand, the greatest of the Papal heroes. "Hildebrand and his Age" is the subject of the greater portion of the latter half of the second volume. And here, where we should naturally expect that the author would exhibit his best, what does he do? He cries out that Hildebrand has been misrepresented, that he was a great man — a very great man; that he (Dr. Miley) will show that he was so by opposing extracts from his own (Hildebrand's) letters to the ordinary accounts of him—(for are not letters the genuine evidences of a man's character, the revelations of the soul of the man, as it were?) &c. &c. And then he transfers Sir James Stephen's 'Essay on Hildebrand,' which appeared recently in the *Edinburgh Review*, and has since been republished, almost bodily, into his own pages,—on the pretext, forsooth, that as Sir James Stephen is a more disinterested witness than himself, his appreciation of Hildebrand will be less suspected of partiality! This is book-making with a vengeance! Nor is this the only instance of it. When he comes to the times of Dante, for example, he makes precisely the same kind of use of Mariotti's popular work on Italy — quoting page after page of that writer's account of the great Italian poet, and interfering no farther himself than occasionally to insert an exclamation—"How true!"—"This from an enemy to the Papacy!"—or such like. But in no part of the whole book is the method by which it has been got up more curiously illustrated than towards the close. Will it be believed that in this 'History of the Papal States' the Reformation occupies even nominally but ten or eleven pages,—while, in these, Luther's name appears but in two or three sentences? Dr. Miley, already at the 470th page of his third volume when he reached this subject, was rushing on post haste to the termination which he had prescribed to himself,—namely, to a view of the modern state of the Papacy, in the shape of a rabid denunciation of the Carbonari, of the Italian liberals, and, above all, of the "firebrand" Mazzini and his "armed interlopers, who transformed the capital of the Christian world into something incomparably more horrible than a den of ravenous wild beasts." Even here, where it might have been thought he would be able to supply a good quantity of the writing out of his own abundance of wrath, he is obliged, in his haste we suppose, to fill up his pages with quotations from the *Times* newspaper and from Mr. Mac Farlane's book on Italy,—which latter he finds much to his taste, and which the bitterest enemy of the Papal supremacy must accept, he says, as trustworthy, seeing that Mr. Mac Farlane is, as he has heard, "a zealous member of the Kirk of Scotland," and therefore "above the suspicion of being prejudiced" in favour of any Pope. And thus, at last, Dr. Miley finishes his tour from the Catacombs to Earl Mount-Edgcumbe's pamphlet.

The close of the book renders the object of the author sufficiently evident. Filled with a vehement antipathy to the cause of Italian liberalism, and above all with a vehement hatred of the theory of a dissociation of the temporal from the spiritual power of the Popes, he resolved to discharge this antipathy and this hatred through a book (previously contemplated) that might be called 'A History of the Papal States.' That, even under such circumstances, his book is so bad, must be attributed to the author's inherent deficiencies, to his want of real culture or real power of any effective kind. What, for example, shall we say of the culture of a man who, at this time of day, and even while ostentatiously quoting Niebuhr, exhibits such ignorance of Niebuhr's ideas as to continue to talk of "the outlaw Romulus" as if he were a real personage, and of the murder of Remus as if that were a fact of history? Is it a man thus ignorant of the first principles of historical belief, thus poor and restricted in his intellectual grasp, who is to pass the grand career of the Papacy under review, or say the right word regarding such stupendous apparitions as a Charlemagne, a Hildebrand, or a Dante?

A System of Aeronautics, comprehending its Earliest Investigations, and Modern Practice and Art. Designed as a History for the Common Reader, and Guide to the Student of the Art. By John Wise, Aeronaut. Philadelphia, Speel.

"He who can swim need not despair to fly," said the Philosopher of Fleet Street, in his charming romance;—and the thought expressed is nearly as old as the hills. Dreamers in all ages have revived the theory of "man's right to mount the skies,"—and from time to time science has held out a hope that the human brain might accomplish what the human heart so strongly wished. "It will be as common hereafter," wrote the learned Bishop Wilkins, "for a man to call for his wings, when about to make a journey, as it is now to call for his boots and spurs." The wings—at least, in the shape anticipated—have not yet come into general use,—and, indeed, it is now known that they would be an incumbrance. When anatomy discovered that the human frame would not supply muscular power sufficient to work appendages in the form of wings large enough to support it in the atmosphere, the discovery was felt as a sad rebuke to the upward aspirations, —as a fact which placed man in one respect, not only "a little lower than the angels," but a little lower than the eagles. The desire to monopolize all the powers of nature—to swim like the fish, to fly like the birds, to walk the earth like the animals, to combine the strength of the lion with the swiftness of the horse—is inherent in man. He is not content to be the head. He strives to concentrate in his own person all the attributes of creation;—and in his own way he does so. Out of the fiery and the watery elements he has made himself wings,—the horse in its race and the eagle in its flight are left far in his rear,—and out of the lightnings of heaven he has created messengers who "put a girdle round about the earth in forty minutes" for his service.

The desire to fly is the dream of childhood. The history of aerial navigation has its mythical age, like other history,—its tales of wonder and mystery,—the flying pigeon of Archytas,—the story of the luckless aeronaut of the time of Nero,—and so forth. But it is only in modern times that the subject of air-sailing came to be popularly comprehended as different from magic and witchcraft, and to be pursued on scientific principles. Roger Bacon proposed to fly by means of thin copper globes filled with "ethereal air or liquid fire":—and as the true nature of the atmosphere came to be understood by

the learned, numerous plans for flying were proposed. None, however, had much success until the Montgolfiers invented their balloon, in 1782. This at once turned the attention of the public and of learned bodies to the subject. The heated air with which the Montgolfiers inflated their machine soon gave place to the lighter hydrogen; and the possibility of carrying huge weights through the atmosphere was demonstrated by experiment. It is difficult to read the contemporary records of the state of public feeling in regard to this discovery without a smile. Geographical discovery had lost a portion of the romantic and absorbing interest which had attached to it in the time of the earlier voyagers,—but here was a new and grander field of operation. Columbus had discovered a new continent,—now men were about to find a new world! Voyages to the moon and planets began to be discussed as feasible matters. The new region of space opened up for the investigation of man was boundless—and the idea of scaling the heavens was popularly received in every coffee-house in Paris. Even science was startled from its calm attitude by this event. The genius of Europe turned to the Academy, as it had done to Seville in the days of Columbus,—and the *Conservatoire des Arts* was looked on as the point of embarkation for the skies.

Of course, this enthusiasm died away as the experiments proceeded; but aerial voyages retained some of their interest for the public after the first brilliant dreams had passed away in disappointment,—partly from their danger, and partly from the lurking idea that they might yet be turned to practical account. From both these causes, they are still attractive,—as the almost daily ascents from London prove. In America, Mr. Wise assures us, they are extremely popular; although as yet very little practical value has been extracted from them, in spite of the skill and intrepidity exhibited by the race of air-navigators.

From the account of a few remarkable voyages collected by Mr. Wise, we will present an extract or two. The following relates to the first trip across the sea ever attempted in a balloon.—

"The most remarkable aerial voyage that was made soon after the discovery of aerostatic machinery, was accomplished by M. Blanchard, in company with Dr. Jeffries, an American physician, who was at the time residing in England. On the 7th of January, 1785, in a clear frosty day, the balloon was launched from the cliff of Dover, and, after a somewhat perilous adventure, they crossed the Channel in something less than three hours. The balloon, after its release, rose slowly and majestically in the air; they passed over several ships, and enjoyed a grand prospect of the numerous objects below them. They soon, however, found themselves beginning to descend, which put them to the necessity of throwing over half their ballast, when they were about one-third way across the Channel. When they got about half way across they found themselves descending again, upon which they threw over the balance of their sand; also some books they had with them. All this failed to overcome the gravitating power of the balloon. They next commenced throwing overboard their apparatus—cords—grapples, and bottles. An empty bottle seemed to emit smoke as it descended, and, when it struck the water, the shock of the concussion was sensibly felt by the aeronauts. Still, their machine continued to descend, when they next betook themselves to throwing off their clothing; but, having now nearly reached the French coast, the balloon began to ascend again, and rose to a considerable height, without compelling them to dispense with much of their apparel. They passed over the highlands between Cape Blanc and Calais, and landed near the edge of the forest of Guiennes, not far beyond Calais. The magistrates of the town treated the aerial travellers with the utmost kindness and hospitality. The King of France made M. Blanchard a present of 12,000 livres, as a token of appreciation of the aeronaut's perseverance and skill in the newly-discovered art."

The voyage of M. Testu is one of the most curious in the annals of aerostation.—

"On the 18th of June, 1785, M. Testu ascended from Paris. His balloon was twenty-nine feet in diameter, constructed by himself, of glazed tiffany, furnished with auxiliary wings, and filled, as had now become the fashion, with hydrogen gas. It had been much injured by wind and rain during the night before its ascension; but, having undergone a slight repair, it was finally launched, with its conductor, at four o'clock in the afternoon. The barometer then stood 29·68 inches, and the thermometer as high as eighty-four degrees, though the day was cloudy and threatened rain. The balloon had at first been filled only five-sixths; but it gradually swelled as it became drier and warmer, and acquired its utmost distension at the height of 2,800 feet. But to avoid the waste of gas or the rupture of the balloon, the navigator calculated to descend by the reaction of his wings. Though this force had little efficacy, yet at half-past five o'clock he softly alighted in a corn-field in the plain of Montmorency. Without leaving the car, he began to collect a few stones for ballast, when he was surrounded by the proprietor of the corn and a troop of peasants, who insisted on being indemnified for the damage occasioned by his idle and curious visitors. Anxious now to disengage himself, he persuaded them that, his wings being broken, he was wholly at their mercy. They seized the stay of the balloon, which floated at some height, and dragged their prisoner through the air in a sort of triumph towards the village. But M. Testu, finding that the loss of his wings, his cloak, and some other articles, had considerably lightened the machine, suddenly cut the cord, and took an abrupt leave of the clamorous and mortified peasants. He rose to the region of the clouds, where he observed small frozen particles floating in the atmosphere. He heard thunder rolling beneath his feet, and as the coolness of the evening advanced, the buoyant power of his vessel diminished, and at three quarters after six o'clock, he approached the ground with his car near the Abbey of Royaumont. There he threw out some ballast, and in the space of twelve minutes rose to a height of 2,400 feet, where the thermometer stood only at sixty-six degrees. He now heard the blast of a horn, and descried some huntsmen below in full chase. Curious to witness the sport, he pulled the valve and descended at eight o'clock, between Etouen and Varville, when, rejecting his oars, he set himself to gather some ballast. While he was thus occupied, the hunters galloped up to him. He then mounted a third time, and passed through a dense body of clouds, in which thunder followed lightning in quick succession.

> 'With fresh alacrity and force renewed,
> Springs upward, like a pyramid of fire,
> Into the wild expanse, and through the shock
> Of fighting elements, on all sides round
> Environed wins his way.'

The thermometer fell to twenty-one, but afterwards regained its former point of sixty-six degrees, when the balloon had reached an altitude of 3,000 feet. In this region, the voyager sailed till half-past nine o'clock, at which time he observed from his 'watch-tower in the sky' the final setting of the sun. He was now quickly involved in darkness, and enveloped in the thickest mass of thunder clouds. The lightnings flashed on all sides, and the loud claps were incessant. The thermometer, seen by the help of a phosphoric light with which he had provided himself, stood at twenty-one degrees, and snow and sleet fell copiously around him. In this most tremendous situation the intrepid adventurer remained the space of three hours, the time during which the storm lasted. The balloon was affected by a sort of undulating motion upwards and downwards, owing, he thought, to the electrical action of the clouds. The lightning appeared excessively vivid; but the thunder was sharp and loud, preceded by a sort of crackling noise. A calm at last succeeded, he had the pleasure to see the stars, and embraced this opportunity to take some necessary refreshments. At half-past two o'clock the day broke in; but his ballast being nearly gone, he finally descended a quarter before four o'clock, near the village of Campremi, about sixty-three miles from Paris."

Closely connected with balloons is the subject of parachutes,—the machine for enabling the aeronaut to descend from the sky without the aid of his balloon. In the first instance the idea was taken from the umbrella or parasol.—

"Father Loubere, in his curious account of Siam, relates that a person, famous in that remote country for his dexterity, was accustomed to divert exceedingly the king and the royal court by the prodigious leaps which he took, having two umbrellas with long slender handles fastened to his girdle. He generally alighted on the ground, but was sometimes carried by the force of the wind against trees and houses, and not unfrequently into the river. Not a great many years ago, the umbrella was, at least on one occasion, employed in Europe with similar views, as well as in our own country. In the campaign of 1793 a French general, named Bournonville, having been sent by the National Convention, with four more commissioners, to treat with the Prince of Saxe-Coburg, was, contrary to the faith or courtesy heretofore preserved in the fiercest wars that have raged in civilized nations, detained a prisoner with his companions, and sent to the fortress of Olmutz, where he suffered a rigorous confinement. In this cruel situation he made a desperate attempt to regain his liberty. Having provided himself with an umbrella, he jumped from a window forty feet high; but, being a very heavy man, this screen proved insufficient to let him down safely. He struck against an opposite wall, fell into the ditch, and broke his leg, and was carried in this condition back again to his dungeon. Blanchard was the first person who ever constructed a parachute for the purpose of using it with a balloon in cases of accident while aloft. During an excursion which he took from Lisle, about the end of August 1785, during which he traversed without halting a distance not less than 300 miles, he let down a parachute, with a basket fastened to it containing a dog from a great height, which fell gently through the air, and let the animal down to the ground unhurt. Since that period the practice and management of the parachute have been carried much farther by other aeronauts, and particularly by M. Garnerin, who has dared repeatedly to descend from the region of the clouds with that very slender machine. This ingenious and spirited Frenchman visited London during the short peace of 1802, and made two fine ascents with his balloon, in the second of which he let himself fall from an amazing elevation with a parachute. This consisted of thirty-two gores of white canvas formed into a hemispherical shape of twenty-three feet in diameter, at the top of which was a round piece of wood ten inches in diameter, and having a hole in its centre admitting short pieces of tape to fasten it to the several gores of the canvas. About four feet and a half below the top a wooden hoop of eight feet diameter was attached by a string from each seam; so that when the balloon rose, the parachute hung like a curtain from this hoop. Below it was suspended a cylindrical basket covered with canvas, about four feet high and two and a quarter wide. In this basket the aeronaut, dressed in a close jacket and a pair of trowsers, placed himself, and rose majestically from an inclosure near North Audley Street, at six o'clock in the evening of the 2nd of September. After hovering seven or eight minutes in the upper region of the atmosphere, he meditated a descent in his parachute. Well might he be supposed to linger there in dread suspense, and to

> ——————— look awhile
> Pondering his voyage; for no narrow frith
> He had to cross. * * * *
> He views the breadth, and, without longer pause,
> Downright into the world's first region throws
> His flight precipitant, and winds with ease,
> Through the pure marble air, his oblique way.

He cut the cord by which his parachute was attached to the net of the balloon; it instantly expanded, and for some seconds it descended with an accelerating velocity, till it became tossed extremely, and took such wide oscillations that the basket or car was at times thrown almost level or horizontal with the parachute. Borne along at the same time by the influence of the wind, the parachute passed over Marylebone and Somers'-town, and almost grazed the houses of St. Pancras. At last it fortunately struck the ground in a neighbouring field; but the shock was so violent as to throw poor Garnerin on his face, by which

accident he received some cuts and bled considerably. He seemed to be much agitated, and trembled exceedingly at the moment he was released from the car. One of the stays of the parachute had chanced to give way, which untoward circumstance deranged the apparatus, disturbed its proper balance, and threatened the adventurer, during the whole of his descent, with immediate destruction. At the moment of separating the parachute the balloon took a rapid ascending motion, and was found, next day, twelve miles distant from the place of departure."

M. Garnerin, however, was not daunted by this accident. He became bolder and bolder in his experiments, and at length ventured to ascend in the darkness of the night:—a feat common with the aeronauts of our own country, but forty years ago new to the public, and considered a proof of extraordinary daring.

Mr. Wise is, of course, highly impressed with the dignity and importance of his calling. He thinks the balloon might be usefully employed in the public service, both in peace and in war. He proposed, during the war with Mexico, to capture the fortress of St. Juan d'Ulloa by means of a war-balloon filled with rockets and other destructive missiles; but the government refused his offers,—and the failure of the more recent attempt of the Austrians to blow up Venice by means of balloons may help to justify their refusal. The suggestion for a leaping machine to assist exploring parties is at least curious.—

"If we take a balloon of limited size, about eighteen feet in diameter each way, it will, when inflated with hydrogen gas, be capable of raising 160 pounds, independent of its own weight. Now, if this be so fastened to a man's body, as not to interfere with the free use of his arms and legs, he may then ballast himself so as to be a trifle heavier than the upward tendency of the balloon, which will be nearly *in equilibrio*. If then he provides himself with a pair of wings, made on the bird principle, with socket joints to slip over his arms at the shoulders, and a grasping handle internally of each one, at the distance from the shoulder joint of the wing, as the distance is from the shoulder to his hand, he may beat against the air with his wings, and bound against the earth with his feet, so as to make at least a hundred yards at each bound. This the writer has often done, in the direction of a gentle wind, with the aid of his feet alone, after his balloon had descended to the earth; and, on one occasion, traversed a pine forest of several miles in extent, by bounding against the tops of the trees. Such a contrivance would be of inestimable value to exploring expeditions. Landings to otherwise inaccessible mountains; escapes from surrounding icebergs; explorations of volcanic craters; traversing vast swamps and morasses; walking over lakes and seas; bounding over isthmuses, straits, and promontories, or exploring the cloud-capped peaks of Chimborazo, could thus all be easily accomplished."

The author gives a long account of his own air voyages:—but none of these seem of sufficient importance to justify transcription. Those of our readers interested in the subject may profitably turn to the work for themselves.

The Progress of the Intellect, as exemplified in the Religious Developement of the Greeks and Hebrews. By Robert William Mackay. 2 vols. Chapman.

The readers of this journal are sufficiently acquainted with our rule of avoiding controverted points in politics and theology; and this rule requires us to dismiss the controversial portion of Mr. Mackay's work with a very brief notice. To do complete justice to the contents of his volumes would involve ourselves and our readers in several vexed questions the discussion of which may be more appropriately conducted in other periodicals than in ours. Without transgressing our principle we may, however, give an idea of Mr. Mackay's opinions. This we will do without comment:—employing, when possible, the phraseology of the author himself.

According to the views of Mr. Mackay, the mythical element still holds its ground in the religion and philosophy of the present day. Mythology is but the exaggerated reflection of our own intellectual habits; and the understanding of this may serve as a useful warning against that tendency in the human mind which leads us to mistake the subjective for the objective,—the inner sense for the external envelopement. Habitual modes of thought are reflected in language; and mankind are frequently deceived by their own figurative expressions, and often give a matter-of-fact interpretation to what was meant by the writer for bold metaphor. Everything appears miraculous before it is understood; and miracles in the ancient sense did not necessarily involve the difficulties which they do in the modern. In the modern sense, a miracle implies a direct infraction of the order of nature:—with the ancients a miracle was little more than a signal exhibition of superior wisdom or address. Miracles die out as they approach the confines of civilization; and narratives which are generally understood to imply miraculous or supernatural agency, when correctly rendered into modern phraseology must be regarded as *mythi*. The religious sentiment is forced into a different direction without being weakened by the cultivation of the reason; so that, at some future period artificial forms and transmitted dogmas will have completed their mission, and will be absorbed in a system more philosophical and natural. Even if miracles in the modern sense were credible, their value as a proof of doctrine would be questionable. Science is methodized experience. At first, all science appears merged in religion:—afterwards, religion is, as it were, swallowed up in science. The more we know, the more we venerate; and the reverence only which is the joint result of sentiment and knowledge can survive the attacks of change and time, because it is never chained to an obsolete opinion or to an immoral practice. Hence Mr. Mackay contends that the religious sentiment can be matured only through scientific cultivation. Religion, including morality, he says, is nothing more than well-directed education. If the mind attempts to forestall the industry of future ages by premature theories and creeds, to idolize its notions as entities, and, whether on scientific or on religious grounds, to treat its acquired experiences as final, all mental progress is arrested. Religion is the *ascensio mentis in Deum per scalas creatarum rerum*,—the evolving of the grounds of hope, faith, and duty from the known laws of our being and from the constitution of the universe. True faith is a belief in things probable,—the assigning to certain inferences a hypothetical objectivity; and on the conscious acknowledgment of this hypothetical character alone depends the advantage of faith over fanaticism,—its moral value and dignity. If man is not permitted to solve the problem of existence, he is at least emboldened to hope and to infer so much from its actual conditions as to feel confident as to its results:—faith takes up the problem where knowledge leaves it. The material world is as much the object of faith as the unseen Deity, or as the anticipated renewal of our existence. By faith, or that transcendental view which the spirit of religion superadds to science, the distant is brought near, the temporary is made continuous, the finite infinite:—we see evil, yet believe in universal good,—we see diversity, but believe in unity,—we are surrounded by change and death, yet cling to the certainty of stability and eternal life.

We have said enough to enable our readers to understand the general scope of Mr. Mackay's work. The above opinions will be no novelty to those who have some acquaintance with recent theological literature. The acceptance of the philosophy of Kant, modified by the study of the works of Fichte so far as the latter are intelligible, naturally results in conclusions like the above. Mr. Mackay brings forward in support of his views an amount of erudition which will prove formidable to his antagonists. Most of the best German editions of the Greek and Latin classics seem to be perfectly familiar to the author; who knows well how to wield such ponderous materials, though occasionally his style may be considered rather diffuse. The account of the theosophy of Aristotle, given in the first volume, is evidently the production of a master of the subject.

Stella and Vanessa: a Romance from the French. By Lady Duff Gordon. 2 vols. Bentley.

Three among the modern professors of *belles lettres* in France have taken real interest in—not given compulsory attention to—our English literature and history,—have cordially commented on our "celebrities," or attempted to introduce them in fiction. One is M. Alfred de Vigny, whose *Chatterton* and *Collingwood* make a figure among the *Quasimodos* and *Bug Jargals* of his contemporary dramatists and romancers. The second is M. Philarète Chasles, whose criticisms express a loving study of the literature to which the criticized parties belong. The third is M. Leon de Wailly, who is known to all conversant with the select literature of the two countries as having translated 'Hamlet' and the Songs and Poetry of Burns,—the last about as untoward a task as ever French ingenuity proposed to itself. Some of us have read with pleasure, too, his novel of 'Angelica Kauffmann,'—where, in spite of tediousness and weak conduct of story, a considerable knowledge of English life and letters was evidenced. The same characteristic will be found, united with more of the conditions of a work of art, in the tale before us. It originally appeared in the scattered form of the *feuilleton*, and has now been thought worthy of collection and paraphrase by a translator no less exact, spirited and lively than Lady Duff Gordon.

It was an odd idea on the part of a French writer to undertake the defence of Dean Swift in those mysterious sentimental transactions wherein the happiness of two—if not three—persons was irretrievably destroyed by vacillation, eccentricity, and selfishness. The position which the bitter wit and intriguing politician accepted and maintained with regard to Mrs. Johnson and Miss Vanhomrigh is, after all, not a solitary instance of its kind. There are many men whose vanity is to be satisfied only by the exclusive and solitary sacrifice of other existences to theirs. Aware of the unworthiness of this engrossing coquetry, they are unable to resist the satisfaction which it ministers to them; and yet, when the reckoning comes, they will appeal to "gods and men" as piteously as though they were persecuted by some tyrannical and malicious destiny. This is, however, our view of the case,—not M. Leon de Wailly's. Without any recourse to unnatural combinations or furious *coups de théâtre*, he has set himself seriously to apologize for the Dean of St. Patrick's. He paints him not as the male coquet, but as the victim of circumstances and of his own self-sacrificing resolution not to give pain. In this fictitious defence M. de Wailly has, voluntarily perhaps, overlooked one point of the case which might have been thought tempting,—namely, the hypothesis that the torments to which the satirist exposed his victims were the unconscious cruelties of one whose composition was "freaked" by insanity long unsuspected

On the other hand, by this very avoidance of one piquant and primary tint, the picture may possibly have gained something of unity. As it is, we have merely a sober, delicately-touched piece of heart-history:—the manner of which will be best indicated by an extract of one of the principal scenes.—

"The watchman was calling twelve as the ladies of St. Mary's started on their way to the Deanery, under Tisdal's escort. It was freezing and the streets were dry. They took advantage of this to go discreetly on foot. This furtive walk was very unlike the triumphal procession which Mrs. Dingley had formerly pictured to herself for her young friend's wedding. * * As far as Esther was concerned, Swift had willed it so: and except when her jealousy was roused, she could have no other will than that of Swift. It was a night most favourable to concealment, a night without moon or stars. The two ladies had purposely prolonged their visit in order to be more sure of not meeting any one, and accordingly when they started the whole town seemed buried in sleep, and the monotonous voice of the watchman was the only sound that broke the silence of the streets. When they left the house, however, Esther thought that she saw on the other side of the street a man standing motionless and apparently on the watch. Although the necessity for concealment naturally disposes every one to suspicion, a circumstance so slight as that of a man standing at the corner of the street would hardly have been sufficient to cause her any uneasiness. But some hours earlier, when coming out of their house in Stafford Street, she had likewise observed a man who seemed to be mounting guard before their lodging. But for this second occurrence she would have attached no importance to the first,—this time, however, she could not refrain from remarking it to Mrs. Dingley. 'What a fancy!' said Mrs. Dingley, determined to deny the possibility of danger, in order to keep herself from getting frightened. And apparently she was justified by the event, for they continued their solitary walk in peace. However, when they had reached their destination, the same human figure re-appeared at a distance, while Tisdal was opening the little garden gate. Supposing it to be a spy, it would have been more prudent to walk on further, and try to mislead him. But fear is unreasoning, and Mrs. Dingley, who began to feel terribly frightened, could only hurry the Canon to let them in and to shut the door behind them as quickly as possible. * * The blazing logs on the hearth of the pavilion into which Swift conducted them dispelled the phantoms conjured up by the darkness of night, and called up a fresh train of thought in their minds. The room they were in was a sort of summer saloon, where nothing indicated the ceremony about to be performed. But Stella could not enter it without a certain religious awe; in her eyes the saloon was a chapel, and the table, with its green baize cover and wax candles, an altar. * * Tisdal was in the garden, waiting for the Archbishop, and as soon as Swift had installed the ladies, he joined him there. The cathedral clock struck half-past twelve. 'Not yet come!' cried he, finding Tisdal alone. 'No, not yet.'—'This is unheard of conduct,' resumed Swift, stamping. And he began to pace rapidly up and down before the door. His impatience was perfectly intelligible. He must be anxious to place between himself and the image of Mrs. Vanhomrigh the obstacle of an irrevocable act, the adamantine wall of necessity.—'Nothing but the age and infirmity of our good Archbishop,' said Tisdal, 'could render it excusable in him to keep others waiting under such circumstances.'—'You are quite right: it's so cold.'—He was always the same!—Tisdal made no answer, and they walked up and down together without speaking until two gentle taps at the garden gate announced the arrival of the Archbishop.—'I'm afraid, Mr. Dean, that I'm late,' said the Archbishop. 'Pray conduct me at once to the ladies, that I may ask their pardon. I hope they will forgive me. These nocturnal expeditions are not much suited to my age.'—The pardon had been granted before it was asked. Mrs. Dingley had taken advantage of the time to repair the disorder of her own dress, and to impart a bridal appearance to that of her young friend. This was no easy task; for to the great disappointment of Mrs. Dingley, Swift had desired that Stella should remain as she was, in her grey silk gown. But she was sufficiently adorned by the modest looks and downcast eyes which are more becoming than all the bridal wreaths and laces in the world. She looked charming thus.—Poor Tisdal! The Archbishop could not refrain from stealing a look at him. He was watching Mrs. Johnson with deep interest, but with perfect calmness. The Archbishop proposed to begin the ceremony. The form of asking whether there be any one that knows 'any just cause or impediment why the marriage should not take place,' filled all present with a sort of terror. They felt as if Mrs. Vanhomrigh would come into the room and raise her voice to protest against the marriage; and it was not until after a much longer interval than usual between this question and that which follows it, that the Archbishop, still visibly agitated, was able to address to Swift the hallowed question:—'Wilt thou have this woman to thy wedded wife, to live together after God's ordinance in the holy estate of matrimony? Wilt thou love her, comfort her, honour and keep her in sickness and in health; and forsaking all other, keep thee only unto her so long as ye both shall live?'—'I will,' answered Swift, in a firm voice. The Archbishop recovered his composure, and turning towards the bride, he said:—'Wilt thou have this man to thy wedded husband, to live together after God's ordinance in the holy estate of matrimony? Wilt thou obey him and serve him, love, honour and keep him in sickness and in health; and forsaking all other, keep thee only unto him so long as ye both shall live?'—'I will,' said Esther, in a timid but heartfelt tone. The Archbishop went on:—'Who giveth this woman to be married to this man?'—All present looked at one another—who was to act as father to the bride? In the general hurry no one had thought about it. Stella turned pale. Tisdal stepped forth from the second row whither he had withdrawn, and taking her by the hand led her up to the Archbishop. Great heaven, was he the man to do it!"

To those who are accustomed to the average ways of the French novelists, the almost Quaker-like dryness of tone of the above will come with the air of a surprise. To ourselves, after so much inflation, exclamation, epithet, contortion, as we are used to expect from our neighbours, its effect is welcome and agreeable. We cannot commend 'Stella and Vanessa' as rich in incident; but by all who can dispense with high excitements for the sake of delicacy and quietness, and by all whose nationality leads them to regard such exercises as M. de Wailly's with approving curiosity, his romance (as he calls it) may be found an agreeable variety.

Address delivered by the President of Queen's College, Galway, at the close of the Session 1849-50. Dublin, Hodges & Co.

It behoves all who feel an interest in the prosperity of Ireland to inform themselves of the real constitution and merits of the new Colleges; and we can recommend no more ready method of gaining this information than by an attentive perusal of Mr. Berwick's admirable Address. We could propose no more efficacious antidote to the mischief that may possibly be attempted at the Roman Catholic Synod to be held at Thurles on the 15th instant, than the extensive circulation of this discourse, printed, if possible, in a very cheap form. It is a model of lucid exposition, and of calm but eloquent argument.

The history of the foundation of these colleges is familiar to most of our readers. When the bill was introduced to parliament for founding these institutions upon the principles of "united education and religious equality," defects were pointed out.—

"No provision was made for religious instruction; no chaplains were appointed to superintend the spiritual interests of the students; no boarding-houses were placed under their superintendence and control; no obligations were imposed on the professors not to interfere with the peculiar views of their pupils."

All these defects have since been remedied. The moral care and spiritual charge of every student are committed to a clergyman or minister of his own creed, called a Dean of Residence. We quote the statute.—

"That the Deans of Residences shall have authority to visit the licensed boarding-houses in which students of their respective creeds reside, for the purpose of affording religious instruction to such students, and shall also have power, with the concurrence of the bishop, moderator, or other ecclesiastical authority, respectively, to make regulations for the due observance of the religious duties of such students, and for securing their regular attendance on Divine Worship;—such regulations, before coming into force, to be laid before the President, and certified by him, as not interfering with the general discipline of the college. But in case the said President shall find that such rules do interfere with such discipline, in such case he shall have power to send back the same to such Dean for re-consideration and amendment in that respect. That the President shall require every person applying for licence to keep a general boarding-house, to produce a certificate of moral and religious character from his clergyman or minister, and shall obtain satisfactory evidence of the suitableness of the proposed establishment, and of its means of providing for the health and comfort of the students. That no clergyman or minister shall be competent to assume or continue to hold the office of Dean of Residences, unless approved by the bishop, moderator, or constituted authority of his church or religious denomination.'—Chap. xviii. sects. 7, 4, 8, 9."

But, it may be said, "this looks very well on paper—very well on the statute book; but how does it work in practice?" Mr. Berwick answers this question by giving the reports of the Deans of Residences, Anglican, *Catholic* and Presbyterian. These ministers, appointed to watch over the moral and spiritual interests of the students, in no case express the slightest apprehension that those interests are likely to be tampered with. Mr. Berwick asks,—

"Are the Protestant and Presbyterian creeds so full of truth, and health, and vigour, that they can stand before, and look, with eagle eye, upon the beams of knowledge, and must the Catholic faith retire into darkness to maintain security?"

And thus he replies to his own question:—

"If I were to say so, is there a Catholic who hears me whose blood would not boil with honest indignation at the opprobrious and unfounded insinuation? In these colleges all persuasions stand on the common platform of complete religious equality; in these colleges the advantages are impartially distributed to all; in these colleges the same identical securities exist for all. Well, then, I appeal to the common sense, to the calm judgment, to the manly reason, to the honest pride of Catholics, and their implicit confidence in the truth of their own faith, will they, by assenting to the calumnies against us, allow it to be said that their religious tenets, unlike those of others, cannot stand the test of knowledge? When I read the history and consider the position of the Catholic Church—when I see the numerous and mighty nations, teeming with the fruits of civilization and intelligence, that walk in her light and bend at her altars—when I see communities, distracted or corrupted for a while, returning to her bosom for consolation and repose—when I see the glorious names that, in bright and endless succession, are ever coming forward to combat in her behalf—when I see, in every clime, her missionaries scaling the steepest ramparts of superstition, and planting on its highest citadels the triumphant banner of her faith—when I see her in this country, unmoved by all the storms of persecution, and breaking into froth those waves that raged and dashed against her—when I see all this, I own I cannot help a smile when I hear that serious danger is impending over her, because a few Protestant professors in Galway and in Cork are permitted to teach her students even such soul-destroying mysteries as Latin, Greek and Arithmetic."

We have said sufficient to indicate our sympathy with the cause of "united education" in

Ireland,—and to express our satisfaction at the masterly way in which that subject is treated in Mr. Berwick's calm but powerful Address. Surely, a system of "united education" would be possible still nearer home.

OUR LIBRARY TABLE.

Rural Hours. By Miss Cooper. 2 vols.—This pleasant book is said to be the maiden production of the well-known American novelist's daughter. We have hitherto been treated to no minute pictures of *such* life and nature from the other side of the Atlantic as are here exhibited. Mr. Audubon gave us the wonders of the wilderness,—Mrs. Clavers sketched the oddities of life in a new settlement,—the sister of Mrs. Howitt in 'Our Cousins on the Ohio,'—and Mr. Headley in his 'Adirondack,'—have severally and variously contributed stores to that treasury out of which imagination can conjure up visions of transatlantic places,—but Miss Cooper's year-book fills a niche which none of the pen-and-ink painters aforesaid have occupied. She chronicles village, wood, and meadow life,—tells how spring wanes into summer, and autumn is followed by winter, in districts where nature is not so wondrous nor man so "unhewn" as in the scenes selected by the writers enumerated. Her entries remind us in their poetical feeling and gentle perspicacity of Gilbert White's. Miss Cooper's allusions to books, too, though not very numerous, are of good quality and in good taste.

Agincourt: a Contribution towards an Authentic List of the Commanders of the English Host, &c. By Joseph Hunter.—The interest of this tract is derived, as the author intimates, from the list which it contains of many of the persons of rank and importance who followed Henry the Fifth to France in 1515, and were present either at the siege of Harfleur or at the battle of Agincourt. In fact, there is in it nothing else to claim particular notice; but the introduction of the documentary evidence is concise and useful,—and all pains have been taken by a very competent person to be accurate. However, it would not be easy to err on so notorious a part of history, and the author obtained his dates from the ordinary sources. Amongst the nobility and others who assisted the King in his French Expedition, the author, from documents recently discovered among the public records, enumerates four royal Dukes, besides the Duke of Exeter (then Earl of Dorset), and eight Earls. Thirteen Barons, and fifty-three Baronets and Knights, with their retainers, Esquires and persons of lower rank, also helped to compose the army,—and respecting these Mr. Hunter gives such information as he happens to have met with. It is sometimes interesting, and generally valuable as a contribution to genealogy. It is, however, to be borne in mind that all the individuals were not in the battle of Agincourt; for some remained in garrison at Harfleur, and others returned to England early in such a state of health as to be unfit for service. We think the author might have omitted the old French forms of indenture between the King and his subjects,—which add nothing to the information, especially as we have elsewhere the substance of them. The only really remarkable point is, the mode in which Henry the Fifth pledged his jewels (including his royal crowns) to some of his nobles as security for the pay which he undertook to give them. There is some amusement in the latter portion of this *brochure*, where it is shown that the King was attended in this expedition by eighteen minstrels, and by six "vallets tailors,"—the last under Sir W. Troppenel, who was knighted, and who was called *Serviens scissoriæ infra magnam Garderobam*. We believe that a Serjeant-Tailor is still attached to the royal household.

Spring Tide; or, the Angler and his Friends. By John Yonge Akerman.—We confess to a want of sympathy with the literature of the rod and line—not excepting even that of old Izaak. We have never yet come across a book professing to describe the pleasures of angling that was not as dull as the so-called sport itself. Mr. Akerman will not mind this proposition of ours, since old Walton comes within its meaning.

Memoirs of the Life and Labours of the late Rev. Josias Wilson. By H. Hastings.—Narrow-minded, untravelled, unlettered, Mr. Wilson appears to have been a fair specimen of the Orange dissenter of Ireland. His life consisted in two or three voyages to England and one "Continental journey," as his biographer is pleased to call a three days' trip to Paris; and his labours in a series of begging excursions. We should not expect to find many lessons as the result of such a career; but out of the traveller's ignorance and intolerance of what he so imperfectly observed in France, and twaddled about on his return, we may learn to stay our impatience when we hear our own country and countrymen abused on the other side of the Channel by those who are equally unable to comprehend what they condemn.

The Early Conflicts of Christianity. By the Rev. W. J. Kip.—This is a reprint of a little book by an American author, the first of a promised series on the developement of Christianity,—not, as we understand it, internally, in its doctrine or discipline, but merely in its outward fortunes, as an historical fact. There is no novelty in the design. Every history of the Church does this—some much more. Nor is there anything in the manner to compensate for the want of novelty of thought. The book is easily written, in the ornate and flowing style now common to transatlantic oratory; but there is no point in the composition, little grace,—and although elaborate attempts are made to paint pictures, no success is achieved. There is nothing in these 'Early Conflicts' which could induce us to advise Mr. Kip to carry the campaign into the middle ages and modern times, as he threatens to do on proper encouragement being afforded.

The Reformation in Spain: a Fragment. By A. F. R.—One of those small works on the cruelties which the Reformers had to suffer in the sixteenth century, which are intended to inform and inflame Protestant zeal. All such stories are in their relation one-sided. Of course it is a melancholy thing to see an *auto-da-fé* in Ghent or Valladolid; but it is equally sad to find the burnings of heretics common in London under both Catholic and Protestant princes. The appeal to history is unfortunately as favourable to one side as to the other; and the attempt to get from it the elements of a sentence for either is radically to mistake the character of that striking period. The soldiers of God—as they thought themselves—asked no quarter, and they gave none.

An Address to Ladies on the Duty and Advantages of Industry and Perseverance in the Attainment of Useful Knowledge. By the Rev. H. Clissold.—This short and sensible address was delivered by its author at the opening of the Ladies' College, Woodlands, Clapham Rise:—an institution founded on the same principles as the Queen's College in London.

A Defence of the Committee of Council on Education: in a Letter to the Hon. Mr. Talbot. By the Rev. Sir Erasmus Williams.—Mr. Talbot having officiated as chairman at the meeting in Willis's Rooms when the Government scheme of education received such ill usage, the Rev. Baronet discharges at him the arrows of his wrath. The defence is, however, rambling and pointless.

The Principal Roots of the Greek Language. By W. Hall.—Is it true, as Mr. Hall asserts, that *all* philologists consider a study of roots to be the first step towards the most solid and expeditious acquaintance with a language? We think not. To those who prefer this method of learning Greek we can honestly recommend the above work, as exhibiting accurate scholarship and careful preparation. At the same time, it appears to us that Mr. Hall somewhat exaggerates its superiority over its predecessors in this department. It is true, he has wisely availed himself of the great law of suggestion, to which so many operations of the mind are subject, by associating with each Greek root some English word derived from it. But if any one will take the trouble to examine these derivatives, he will find that not more than half of them are words familiar to an ordinary learner of Greek. Many are strictly technical, and others never heard or seen. For instance, who ever meets with such terms as *apozem, zetetic, ethmoid, iatraleiptes, colocasia, acamatos, anacamptics*, or *coris*?—all which, with several other technical words, we observed at one opening of the book (pp. 56 and 57). There is no association of the known with the unknown in such cases as these, for the English word—if so it can be called—is as hard to remember as the Greek. What we want is, a good imitation of the French 'Jardin des Racines Grecques,'—which contains all the principal Greek roots, each forming with its meaning a separate verse, and accompanied, as in Mr. Hall's book, by useful notes at the foot of the page.

Educational Outlines.—These are letters by a Lady on what she calls "practical duties." They contain some judicious remarks; and a journal which is appended to them exhibits in a favourable manner the talents of the pupils engaged in its production.

Precious Stones, Aids to Reflection, from Prose Writers of the Sixteenth, Seventeenth and Eighteenth Centuries. Collected by the Rev. R. A. Willmott.—Mr. Willmott is of opinion that his little collection contains some of the costliest thoughts in our English prose; but, with every allowance which can be reasonably asked in favour of a collector's pets, we are compelled to doubt the justice of such a claim. No doubt, many of the "thoughts" here clustered together are of the highest kind:—but how can a collection of "beauties of English prose" be other than imperfect, when writers like Steele, Sterne, Swift, Dryden, Pope, Butler, Burke, Johnson, Goldsmith, and a score of other masters in the arts of high thinking and nervous writing, are omitted? Surely such men have stronger claims to fellowship with the great prose authors of our country than such writers as Blair, Doddridge, Brett, Smith, Kettlewell, and Horneck.—But if we have fault to find with Mr. Willmott's selection, we have still greater objection to his criticism. We refer to only one example. While Dryden is omitted from this new list of prose writers, no less than a dozen pages are given up to Collier,—who was not only "the antagonist," but "whose masculine eloquence may claim for him the glory of being the *rival* of Dryden." This is an opinion of which we suspect Mr. Willmott will continue to enjoy a monopoly.

A Selection from Percy's Reliques of Ancient English Poetry and from Evans's Old Ballads. By the Rev. H. Tripp, M.A.—The title explains the character of this collection; which is very limited in its range,—not containing in all so many as fifty ballads. The compiler's principle of selection having been adopted with reference to educational purposes, he has been mainly solicitous to select pieces of such moderate length as might most readily be committed to memory. He has, moreover, preferred the historical to the sentimental.

Money versus *Life.* By C. Colwell.—This volume professes to pass in review the general subject of colliery accidents, and to show their causes and extent. It treats of the parsimony of coal-owners,—the concealment of deaths in mines,—inaccuracy of returns by coroners,—the iniquitous mode of pillar working,—the necessity for Government inspection, for more shafts,—and the propriety of an adequate provision for widows and orphans of the victims of explosion, &c. Some additional light is thrown on these points, as our readers know, by the Report of the Royal Commissioners employed in collecting information in the great coal-fields of the north:—and, as in the case of factories and prisons, the State will probably see the wisdom of establishing an independent board of inspection for mines.

LIST OF NEW BOOKS.

Allingham's (W.) Poems, 12mo. 8s. 6d. cl.
Art of Manufacturing and Refining Sugar, with Atlas, folio, 31. 3s.
Bowman's (T.) Questions adapted to Hall's Elementary Atlas, 2s.
Bennett's (Rev. W. J. E.) Lives of the Fathers, Vol. II. fc. 6s. cl.
Biekersteth's (Rev. E.) Scripture Help, 20th ed. 12mo. 5s. cl.
Brewer's Guide to Science (Key to Questions in), 18mo. 1s. cl.
Carlyle's (T.) Latter-Day Pamphlets, post 8vo. 9s. cl.
Campan's (Madame) Conversations, German and English, 12mo. 4s.
Churton's Lib. for Million, 'Norton's Tales and Sketches,' 1s. 6d.
Consolatio, or Comfort for Afflicted, ed. by Rev. C. E. Kennaway, 3s.
Cumming's (Rev. J.) Voices of the Night, fc. 7s. cl.
Elliot's (Dr. G.) Sermons on some of the Subjects of the Day, 9s. cl.
Every Day Wonders, or Facts in Physiology, 12mo. 2s. 6d. cl.
Feats of Modern Enterprise, 2 vols. fc. 7s. cl.
Fossatie's (Dr. R.) Sleep Psychologically Considered, cr. 8vo. 4s. 6d.
Gardiner's (W.) The Music of Nature, 3rd ed. royal 8vo. 18s. cl.
Gaussen's (Prof.) It is Written, from the French, 3rd ed. 4s. 6d. cl.
Girdlestone's The Old Testament, with Commentary, Vol. IV. 12s.
Hall's (H. B.) Scottish Sports and Pastimes, 12mo. 3s. 6d. cl.
Helen Bury, by Emma Jane Worboise, 12mo. 4s. 6d. cl.
How to make Home Unhealthy (from the *Examiner*), 12mo. 2s.
Hooker & Arnott's The British Flora, 6th ed. 14s. plain, 15s. col.
Holy Vessels and Furniture of the Tabernacle, folio, 1l. 10s. hf-bd.
Innkeeper, Public Brewer, Butler, &c., by a Practical Man, 5s. cl.
Knox's (Dr. R.) The Races of Man, a Fragment, cr. 8vo. 10s. 6d. cl.
Körner's (T.) Works, Selections from his Poems and Dramas, 8s.
Latham's (R. G.) Natural History of the Varieties of Man, 1l. 1s.
Langford's (J. A.) Religious Scepticism and Infidelity, cr. 8vo. 6s.
Liebig & Kopp's Annual Report of the Progress of Chemistry, 7s.
Lytton's (Sir E. B.) Godolphin, new ed. cr. 8vo. 2s. cl.
Maclaurin's (J.) Form of Process in Scotland, Vol. II. 8vo. 12s. cl.
Milton's Paradise Lost, Illustrated by Martin, 2nd ed. 1l. 11s. 6d.
Miller's (J.) The Principles of Surgery, 2nd ed. 8vo. 16s. cl.
Murray's Handbooks, new ed. So. Germany, 12s. Central Italy, 12s.

CATALOGUE OF THE BRITISH MUSEUM LIBRARY.

It is of the utmost importance that the House of Commons should not be allowed to separate without some formal protest on the part of the literary men of London against the Report of the Commissioners on the British Museum, so far as it relates to the subject of the Catalogue. In March 1847, after a long and provoking experience of the evils arising out of the want of a finding Catalogue—which Catalogue Mr. Panizzi had been expressly appointed to provide—fifty-seven members of the British Association signed a memorial to the Queen praying for relief in the matter,—and in June following a Royal Commission issued to inquire into the grounds of complaint. So gross and patent was the necessity for interference, that the establishment of that Commission was at the time looked on as an equivalent to relief; and we have from that day to this never failed to keep the interests of the public then put in issue prominently in view. The needless delays which followed and the spirit evinced in the conduct of the examinations gradually weakened that first faith in the men to whom those interests had been committed; and the unwillingness to publish their Report when the inquiry was complete gave ominous confirmation to the unwelcome rumours which had crept abroad in relation to the conduct of that inquiry and the character of that Report. Yet, we will venture to say that no man who had not access to the mysteries of the Commission was prepared for a Report in which nine-tenths of the evidence in one direction was made the formal ground of a decision in the other. We scarcely remember such another denial of the public claim and abuse of the public patience. To this day the Report is incomplete, by the terms of its own letter. The Appendix, constantly referred to as amongst the grounds of justification, is cautiously and determinately withheld,—and the Index promised, to facilitate its examination, no amount of remonstrance has been able to obtain. The Commissioners have obviously caught the spirit of procrastination in whose favour they adjudicate. The Index is for our children, we presume,—as the Catalogue is for their children's children.

It is impossible that the pressing interests of literature shall be thus tamely yielded up to the arbitrary dictation of a clique—and the funds voted by the public through their representatives for the supply of a great and immediate need suffered to be diverted to the support of a private and most costly crotchet. The money appropriated in this case is the least part of the waste. Treasures which represent an amount of value far beyond their money worth are lying comparatively idle for want of arrangement,—a library which is one of our great national features is in a sense shut up for want of this door to its contents. It would be as rational for the nation to maintain public clocks without dials. The cause is that of all the reading men of England,—a mighty constituency in these days; and their business is to enforce it in that court which is responsible for the due appropriation of the national funds. A petition for a Finding Catalogue accordingly lies now at Messrs. Reeve & Benham's, booksellers, 5, Henrietta Street, Covent Garden; and will be presented to the House of Commons on Tuesday evening next,—the latest practicable time. The petition is temperately worded as follows:—

To the Honourable the Commons of Great Britain and Ireland in Parliament assembled.

The Petition of the undersigned, authors or editors of literary works published in the United Kingdom, persons connected in other ways with English literature, or persons generally using the Library of the British Museum,

Humbly sheweth,

That your Petitioners are acquainted with the Catalogue of the Printed Books in the British Museum, which is kept in the Reading Room for the use of persons who desire to consult the Library; and, also, with the state of the Library so far as the same is made apparent by such Catalogue.

That such Catalogue is inaccurate and confused, extremely defective in arrangement and altogether wanting in completeness.

That the entries in that Catalogue are several years in arrear.

That the Library is very discreditably defective in many branches of literature; and does not contain such a collection of the works of English authors as is necessary for the purposes of reference and study, and as ought to be found in our National Library.

That these defects, if they have not arisen from the want of a simple published Catalogue of the books which the Library contains, have been encouraged and are perpetuated by that want.

That the non-existence of such a Catalogue is a serious injury to your Petitioners and to all literary persons, and a great impediment to them in their pursuits and studies.

That it deprives them of the advantages which they have a just right to expect from the possession of a great national library which has been for the most part collected, and is now altogether maintained, at the public expense.

That it is also highly prejudicial to the interests of literature, an impediment to public education, extremely detrimental to the usefulness of the British Museum, and calculated to shield and conceal imperfections and mismanagement in that highly important National Institution.

Your Petitioners, therefore, humbly pray that your honourable House will take the circumstances into your serious consideration, and will direct that a simple, concise Finding Catalogue of all the Printed Books in the National Library may be prepared, printed and published in the cheapest form and with the least possible delay.

And your Petitioners, &c.

We trust that the many of our readers who feel strongly on this matter will not lose this important opportunity of putting their feelings personally on record.

EXPEDITION TO CENTRAL AFRICA.

Since my former communication, [see *ante*, p. 739], giving an account of the progress of this Expedition from Tripoli to Mūrsūk, several letters have been received from Dr. Overweg and Dr. Barth,—and from the latter a valuable map, on a large scale, with a detailed description of the country round Tripoli, comprising the mountainous region to the south, which was explored by the travellers during their stay in Tripoli. The following are a few particulars of the general character of this mountainous region.

Three divisions are distinguished, the *Jefran* (or Jebel), the *Garian* (or Ghurian), and the *Tarhôna* (or Tarhuna). The first lies S.W. from Tripoli, being intersected by the route to Ghadamus, and it forms the western-most part of the range. Geologically, it consists in the lowest strata of the Wadis, of "bunter Mergel" and gypsum, above which follow sandstone, marl, and especially limestone. No traces were discovered here of volcanic formation; which appears only in the Garian Mountains,—namely, that portion of the range which is situated due south from Tripoli. In this group, basaltic cones surmounted by fine columns break through the white limestone hills. The mighty Mount Tekut, near the Garian Pass, is a fine extinct crater. In the third group, the Tarhôna Mountains, S.E. from Tripoli, volcanic formation again entirely disappears. The average elevation of the table-land stretching from these mountains southwards is, 2,000 feet towards the western extremity, gradually descending to 1,000 feet towards the east at the Tarhôna Mountains. The table-land and higher parts of the Jefran district are of a stony and arid character; and it is only in the Wadis that dates, olives and figs are cultivated. On the other hand, the surface of the Garian district consists of a rich red loam, in the highest degree fertile, and covered with the most luxuriant plantations of olive trees and fields of saffron. It is in this rich loam that the inhabitants have dug their subterranean dwellings. The Tarhôna Mountains are characterized by the general cultivation of corn, and by the abundance of ruins of Roman settlements, towers and monuments.

Mūrsūk and its environs are described by the travellers as a dreadful "sand pit," completely surrounded with sand hills; which, coupled with the pestilential evaporations of the salt lakes near the town, renders the climate so unhealthy as frequently to prove fatal to Europeans. Happily, none of the members of the Expedition were affected by it. They left Mūrsūk on their way to Aghadis; Mr. Richardson by Ghat, and Dr. Barth and Dr. Overweg by Arikin,—which latter place is eighteen days' journey S.W. of Mūrsūk and three days S. of Ghat. They travel with a large caravan, and under the escort of several Tuarick chiefs; the Expedition having for their own use about forty camels, laden with their effects and merchandise, which latter they consider the best substitute for money in the countries they will have to traverse. They hope to reach Aghadis in about sixty or seventy days. Dr. Overweg, in his last letter, dated the 17th of June, and written while on the march to Arikin, thus alludes to the increasing heat.—"Yesterday the thermometer rose to 45° C. (or 113° Fah.); but we are getting accustomed to this,—for just now (4 p.m.) on entering the tent I find the air in it delightfully cool, as contrasted with the heat outside, but on looking at the thermometer I find, to my surprise, that the temperature of this 'cool' air is 42° C. (or nearly 108° Fah.)."

August 6. Augustus Petermann.

OUR WEEKLY GOSSIP.

Few meetings of the British Association have been more entirely successful than the one just closed. If any doubt could now be entertained of the progressive usefulness of this great body, it would be removed by a comparison of the Edinburgh meeting just past with the first meeting in the same place. The discussions were of a more elevated character,—the papers more valuable; and in every instance it has been felt that the Association has done much to create the spirit in which so much has been achieved for science. Edinburgh, in respect of its University, the love of science that pervades its population, and its beautiful and interesting situation, is well suited as a site for the meetings of the Association. The entertainments given by public bodies and private individuals maintained the character of the Scotch for hospitality. In this instance it has not been the titled men, but the learned and scientific, who have taken the lead. The College of Physicians gave a grand entertainment on Friday; and on Tuesday the President of the College of Surgeons, Mr. Syme, invited one hundred and fifty guests to a splendid *fête* in his own residence at Morningside.

The Ray Society held its seventh Anniversary during the meeting of the British Association in Edinburgh. Sir William Jardine, Bart. occupied the chair. The Report stated that there were 775 members in the Society,—which is a slight diminution from the numbers of last year. The Council propose to publish for the year 1850 the second volume of Agassiz's 'Bibliographia Zoologiæ et Geologiæ' and a fifth part of Alder and Hancock's 'Nudibranchiate Mollusca.' Instead of a third volume, it is proposed to increase the number of plates in the great work of Alder and Hancock, which it is expected will be complete in two more parts. It was also announced that the first part of Mr. Darwin's 'Monograph on the Barnacles' was ready for publication,—and that the Society might hope for a work on the Diatomaceæ, by Messrs. Ralfs and Jenner. Prof. Allman stated that his work on the British Zoophytes would be of more value the longer it was delayed, on account of the great increase in the number of species which was constantly going on.—The President urged on the members the necessity of obtaining new subscribers,—as every additional subscription enabled the Council to publish more matter.

Among the notes of preparation that are sounding on all sides for the Exhibition of 1851, we may mention that papers have been transmitted to the Commissioners announcing that it is the intention of the inhabitants of Canada to hold a Grand District Industrial Fair in the city of Montreal, in September or October next, in connexion with the International Exhibition to be held in London in 1851. The intention of the Committee is to give the Canadian public an opportunity of presenting for exhibition specimens of the natural and manu-

factured articles of agriculture, commerce, art, scientific ingenuity and skill, and generally of every species of production that will represent the industry and resources of that country. From the articles exhibited competent judges will select such as may be deemed worthy of transmission to the Great Industrial Exhibition in London.—The Government of Wurtemberg have appointed a Commission to take charge of the interests of that country in the approaching industrial contest. M. Sauttar is the chairman of the committee.

The banquet intended to be given in York to the Lord Mayor of London by 104 of the mayors of the principal boroughs in the United Kingdom, in return for his splendid hospitality to them at the Mansion House by way of inaugurating the great idea of the Industrial Exhibition, is to take place on Friday, the 25th of October—that day having been named by his Royal Highness Prince Albert, who has signified his intention to take part in the entertainment. The committee which has been appointed from the number to carry out the necessary arrangements will invite the Royal Commissioners of the Industrial Exhibition, the Executive Committee, and the Secretaries,—with "such other noblemen and gentlemen as they may think most interested in the objects of the meeting." Each mayor is invited to appear at the banquet in his robes of office; and is further requested to procure a banner, with his own arms, or the arms of his city or borough, delineated thereon, for the purpose of decorating the Guildhall of York, which is to be the scene of the entertainment.

Under the title of the Epidemiological Society, the members of the medical profession and others are forming an association to investigate the history, origin, causes and laws of the propagation of epidemic diseases, with a view to their more effectual prevention or improved treatment. Dr. Babington has been elected its President. It is explained that the Society has no intention of interfering with the investigations of individuals. On the contrary, it proposes to aid them with funds, with a good library, and by putting them in communication with the eminent men of other countries,—and to facilitate their efforts in every way.

We are living, our readers know, in an age emphatically of statues and testimonials. The virtues of the time are giving daily increasing employment to the manufacturers of busts and silver teapots. We know not how many additions are made year by year, in public edifice or private closet, to the volume of English Worthies. It is true, that by this means the editions vary,—and there are pages interpolated in individual copies not to be found in the public library. Each particular society makes notes and writes names of its own in the Book of Merit,—which are adopted with more or less reserve into the State copy or therein rejected altogether. We must confess that the State has not always done its editing to our satisfaction. It is not always the worthiest names that have the best place in its records. It is not often that its commemorations are for those with whom our sympathies are most warmly engaged. We would make many a substitution in its list of honours if we had our will. The men who have laboured in the cause of intellectual light or of moral health should stand on the pedestals that are usurped by more vulgar figures if we had the ordering of the world's Pantheon. We would depose Hannibal in favour of Howard, and give Watt the place of Alexander the Great. But the herald has not yet learned in England to shout the name of the philanthropists. The very darkness amid which these men labour is a cause which hides them from him,—who has an eye for colours. The clients of the philanthropist are for the most part the low castes of the world,—and they are not consulted in the distribution of the public crowns.—It is greatly to the honour of a body of men who met last week at the house of Dr. Forbes that they have undertaken to assert the title of one of these workers in the byeways of humanity. For many years of his useful life Dr. Conolly has maintained the cause of the most neglected and stricken of all the children of misfortune; and therefore it is declared by a resolution passed on the occasion in question that "Dr. John Conolly, of Hanwell, is, in the opinion of this Meeting, eminently entitled to some public mark of esteem and gratitude, for his long, zealous, disinterested and most successful labours in ameliorating the treatment of the Insane." To estimate the full amount of his title, the reader must travel back to the recollection of what asylums for the lunatic were before Dr. Conolly's time; when all the forms of insanity were treated as cases of moral death,—or worse, when men so smitten were separated from human sympathies as of old were the wretches stricken with the plague. But this was not all. To misfortune in the saddest of its shapes was added pain in the meanest of its forms. The wandering mind was addressed through the tortured body. The remedies tried on the madman were such as would drive sane men mad. The whip and the strait-waistcoat were the prescriptions for his disease.—Owing in a great degree to the persevering efforts of Dr. Conolly, all this is now at an end. The worst of maladies is divested of the worst of its features. That shadow, darker than the shadow of death, which was supposed to fall for ever between the patient and the loving hearts without, is exorcised. "Lasciate ogni speranza voi che entrate" is no longer the legend over the madhouse door. The horrid counter-irritation of the whip is abolished,—all the fever-creating forms of personal restraint are removed. The asylum is now a hospital, not a dungeon. Mental disease is treated by appeals to the mind. Imperfect sympathies are nourished, broken memories sought to be repaired, old familiar habits brought forward as mental prescriptions, the wandering intellect taken kindly by the hand, and by every rational means led gently towards home. All means of moral action on the diseased mind are resorted to:—the persuasion of music, the imaginative argument of drama, the power of old pursuit. Every chance is taken that a sudden gleam or effort of thought, struck out by this playing on the old chords, may light, or lift, the mind back to the balance whence, in many instances, it was shaken none knows how or when. The spirit is treated, not as a lute that is stringless, but as one whose strings make discords. The wits are dealt with like "sweet bells out of tune."—Now, even if the statistics of the matter did not confirm the suggestions of common sense as to the efficacy of this system for cure, think of the amount of positive happiness substituted thereby for the old infliction of pain. The door back into the world is left wide open, and the old voices and familiar looks come and go across its threshold. The spirits with which the now disordered intellect consorted in its sane time cross and recross the lunatic's dim path:—who can know that one of them may not be suddenly recognized, and take its old acquaintance home?—Who shall tell what accidental tone may recal the echoes?—Who shall say how the capsized mind may right itself beneath some sudden upheaving of the heart?—At any rate, what are left to it of its powers are scientifically employed in the work of its own renovation,—and if the effort fail, what remain of its sympathies are made ministers to its enjoyment. Who knows, in the worst cases, what angel thoughts may walk the mental darkness, whispering consolation, and keeping down the demon, now that we have expelled the "seven spirits worse than himself," whom of old man cruelly introduced to strengthen him?—So, we, too, are of opinion that Dr. Conolly is "eminently entitled to some public mark of esteem and gratitude,"—and that the world should pay him some portion of the debt of those who cannot pay it for themselves.

The American copyright case—Murray *v.* Bohn and Routledge—has advanced one stage in the Court of Chancery. Vice-Chancellor Bruce on Thursday last ordered that both Mr. Bohn and Mr. Routledge shall keep accounts of what they sell of Mr. Irving's works, pending the removal of the cause to another court, and without prejudice. "The point in dispute," he observed, "was beyond all doubt a very important one, and one which some day must reach the House of Lords:"—adding, as appears by the reports in the daily papers, that "it was impossible to say that the questions which the case involved were settled." The defence will rest in part on the plea that Mr. Washington Irving is an alien, and on the authority of the case decided in the Court of Exchequer by Sir Frederick Pollock. The claim to the injunction will rest in part, it is said, on the plea that Mr. Irving is not an alien; that his father was a native of the Orkneys and his mother a native of Falmouth, and that though he himself was born in New York he is the son of British born subjects, and therefore no alien.

The glaring anachronisms contained in the story of Sir John Duddlestone as related by Mr. Burke in his 'Anecdotes of the Aristocracy, and Episodes of Ancestral Story,' and copied into our columns a fortnight ago [*ante*, p. 783] have aroused the inquiries of more than one correspondent.—The story, says one of these, writing from Bristol, "is well known here. I have seen and heard it repeatedly, and nearly in the words quoted. It is one of our popular legends, and, like most others, has some foundation in fact. Sir John Duddlestone was in all probability knighted, as will presently be seen, about the year 1686, and created a baronet in 1691; yet he is represented addressing Prince George as husband of *Queen* Anne,—and as being knighted by her some sixteen years before she succeeded to the throne, in 1702. Again—if Prince George at the time of his supposed visit to Bristol had been husband of the *Queen*, would not the principal merchants of the city have rather courted than avoided his company? The storm of 1704 would scarcely have ruined a bodice-maker;—it might a tobacco-merchant. A few extracts from 'The Chronological Outline of the History of Bristol,' published in 1824, will suffice for my present purpose:—

'1686, Aug. 25.—The King (James) came here accompanied by George Prince of Denmark, &c. &c.'

'1690, Sept. 5.—The King (William) and Prince George of Denmark sailed from Ireland.

'Sept. 7.—They came in the Duke of Beaufort's coaches to Bristol, and without staying any, rid directly to the Duke of Beaufort's house, (old MS.)'

'1691, Jan. 11.—Sir John Duddlestone, knt. and *tobacco-merchant*, created a baronet.'

Then follows a foot note which *alludes* to, but does not *relate* the above inconsistent tale.

'When did John Duddlestone previously receive the honour of knighthood? * * This addition to Sir John's dignity would imply belief in the story, *so ridiculously related*, of his exclusive hospitality to Prince George. The Prince had visited Bristol with his father-in-law, James, in 1686, and dined at Sir William Hayman's in Small Street. Perhaps his visit incog. was when James became unpopular, and those who envied Sir John's 'blushing honours' trumped up the story alluded to, in which he is said to be a bodice-maker, and his lady the wearer of a blue apron, with a style of phrase not exactly suited to a resident in a principal a situation as that of Mr. Norton's, the bookseller, where they lived. Both lie in All Saints' Church.'

I may add that the mural tablet to the memory of Sir John's married daughter, who died in 1704, is still in excellent preservation in All Saints' Church. All Saints' Church is in the very heart of the city, within fifty yards of the site where stood the High Cross. Next to the Church is the Exchange—then the Post Office, being a detached wing of the Exchange,—and then a modern built house on the spot formerly occupied by Sir John Duddlestone."

The Executive Committee of the Lancashire Public School Association have taken a step for the extension of the principle on which they are combined, by the following important resolution:—"Resolved—That it is desirable that a Second Conference of the Friends of National Secular Education should be held in October next: to decide,—whether the Education movement which has originated in this county, and which has hitherto been prosecuted for a nominally local purpose, should not now be made national in its character; and, in case such change should be determined on, to consider and adopt the principles and provisions of an Education Bill, and arrange for its introduction into the House of Commons in the next session of Parliament.—That the Secretary put himself into Communication with as many as possible of the Friends of National Secular Education resident in various parts of the country, communicating this resolution, and requesting them to arrange public meetings, in their respective localities, for the election of Delegates to the said Conference."

The Acte d'Accusation which specifies the charges against M. Libri has, after a further delay, been published by the *Moniteur* and the law

journals of France. In the absence of this document, we are given to understand that M. Libri had been engaged in preparing for immediate publication a reply to what he has presumed to be its leading points,—and we are further assured that he will now follow up that impromptu answer by a more elaborate and detailed refutation of the published indictment.

We have received an answer, which we are entitled to regard as official, to a paragraph which appeared in our columns some weeks ago [*ante*, p. 687], complaining that the prohibitory system which marks the spirit of reaction in Prussia had found its way into the Royal Library of Berlin. The specific charges of our correspondent on that occasion are formally denied. "Neither," says our informant, "do these regulations preclude any gentleman or lady from consulting the catalogues of the library, nor is any reader confined to one work at a time. The reader may have as many works at once as he can make use of. That a work," adds our informant, "consisting of several volumes, each of which is independent of the other, should in general be given *out of the establishment* volume by volume, is a rule introduced for the benefit of the great numbers of readers; as it must be evident that a reader detaining twelve or twenty volumes of the same work at a time will keep them much longer at home than if he be required to exchange them one by one, or two by two."

FINE ARTS

FINE-ART GOSSIP.—The sale of the rich gallery of the late King William the Second is appointed to take place at the Hague on the 12th of August (Monday next) and following days. Many reports have been in circulation as to the future destiny of this collection. On the one hand, it was asserted, says the *Brussells Herald*, that the Queen Dowager of the Netherlands had resolved on making the greatest sacrifices rather than it should leave the country; on the other hand, it was said that the Emperor of Russia was on the point of purchasing it *en masse*, to increase the importance of the Museum of the Hermitage. Neither of these presumptions has been realized. We borrow from a contemporary the following particulars of the treasures brought together in this gallery, and now about to be dispersed by the hammer. The gallery "is divided into ancient and modern paintings, drawings, and sculptures. There are 192 paintings by the old masters, 162 modern, 370 drawings ancient and modern, and 26 busts and statues—total, 750 items. The Flemish, Bruges, Dutch, German, Spanish, and Italian schools are represented by the most celebrated of their masters—such as Van Eyck, Hemling, Quentin and Jean Matsys, Mabuse, Pourbus, Holbein, Lucas of Leyden, Rubens, Vandyck, Teniers, Rembrandt, Ruysdael, Hobbema, Murillo, Velasquez, Ribeira, Albano, Guido, Canaletti, Palma Vecchio, Raphael, Julio Romano, Titian, and Leonardo da Vinci. Among the painters of the French school are—Charles Armand, Clouet, Claude Gelée, and Poussin. In the collection of modern pictures every country in which the arts are cultivated has been laid under contribution. Among them are mentioned several interesting pieces by Wilkie, produced in the best days of his subtle and keenly observant talent. Nor has France been forgotten. The names of Bracassat, Decamps, Gudin, Jacquand, Lapito le Poitevin, Ary and Henri Scheffer, are honourably inscribed in the catalogue of the late King's pictures. The greater part of the original drawings are by Raphael, Rubens, Da Vinci, Correggio, Michael Angelo, Sebastiano del Piombo, Andrea del Sarto, Tintoretto, Caravaggio, and Vandyck. The palace of the Hague was especially distinguished for containing the works of the most celebrated masters of the Flemish and Bruges schools; and, without doubt, the very curious productions of Vandyck of Antwerp, Van Eyck, Van Orley, Lucas of Leyden, Mabuse, and Holbein, which have escaped the ravages of time, will meet with eager purchasers."—Amateurs, we believe, are flocking to the Hague from all directions, to be present at this remarkable sale.

We understand that the Exhibition of the Designs for the medals in connexion with the Exhibition of Industry is closed:—and that the designs may be had by competitors on their forwarding to the secretary of the Society of Arts the name inclosed in the sealed letters.

A very clever picture, by Mr. Noel Paton, of Oberon and Titania, from the 'Midsummer Night's Dream,' is on view at Messrs. Graves's in Pall Mall. Mr. Paton first obtained distinction for a smaller picture of the same or a very similar subject, exhibited at one of the Westminster Hall Exhibitions. The picture now on view has, our readers know, been purchased for the National Institution of Scotland, at the price of 700 guineas. Here Mr. Paton revels in fairy-land, like Michael Drayton,—or, shall we say, like Shakspeare himself. His picture is full of poetry, and of the fine feeling and rarer resources of his art.

Mr. Labouchere has recently purchased a marble bust of Milton, made, it is said, from the life by an Italian sculptor during the poet's visit to Italy. The sum paid—200 guineas—and the known good taste of Mr. Labouchere speak in favour of the excellence of the bust as a work of Art and also in favour of its authenticity. We have not seen it.

Dr. Waagen, we can announce, has entered into arrangements with Mr. Murray for the publication of a work to be called 'The Treasures of Art in England.' Dr. Waagen's former publication, 'Art and Artists in England,' has been long out of print. The new work will contain extended notices of all our public and private collections of note, and will include critical descriptions of miniatures, missals, rare prints, &c. The treasures of Art on the Continent are to be found in some dozen or twenty great galleries,—the treasures of Art in England are scattered over palaces, public buildings, noblemen's mansions, gentlemen's seats, and merchants' houses. The ready access that Dr. Waagen has found to the several private collections is creditable to our advanced feeling for Art. Had his visit been twenty years back, he would have had a different reception.

MUSIC AND THE DRAMA

HAYMARKET.—The Adelphi company is located here for the present. On Monday Madame Celeste and Miss Woolgar, with Paul Bedford, Wright and Hughes, appeared in 'The Willow Copse,' 'Jack in the Green,' and 'The Double-bedded Room.' These revels, however, are to last but a few nights, while the more appropriate theatre for them undergoes temporary repair; after which, these boards will, we presume, be restored to their legitimate uses. Mr. Webster must provide for competition, since he is likely during the ensuing season to have six respectably conducted theatres to contend against:—a circumstance which will require on his part all diligence, with the best aid that he can obtain both from authors and from actors.

NEW STRAND.—A new drama of remarkable merit was produced here on Monday. It is from the pen of Mr. Shirley Brooks, and is entitled 'The Daughter of the Stars.' The piece is in two acts; the first of which is remarkable for its wit. In this respect it approaches to the brilliancy of Congreve—both as regards the quality and its misapplication; the wit being irrespectively distributed in about equal proportions to every character. The second act is sentimental; its incidents are intricate and of a legal complexion,—memoranda from the note-book of experiences in an attorney's office, appropriate to the uses of the minor drama. The entire play is designed for an attack on social convention and mammon respectability. Poverty is recognized as the only crime by the principal in the action, *The Hon. Antony Hawkstone* (Mr. Farren),—and expediency as the only rule of a wise man's life. He is offended with his nephew *Lieut. Ernest Dalton* (Mr. W. Farren, jun.), not only for having married without his consent, but for having brought his superior officer to trial and conviction by a court-martial. He scorns the young man's honourable principles; and asperses the character of his parents, from whom he had purchased the property which he now enjoys. Having instructed his attorney, one *Crawley*, admirably acted by Mr. G. Cooke, to seek out a missing niece to take the discarded nephew's place, a gipsy, named *Miriam*, or 'The Daughter of the Stars,' most strikingly impersonated by Mrs. Stirling, is introduced into the house. In her own tribe the girl had won reputation as an expert thief, and her *naïve* remarks on society constitute the sarcasm of the dialogue. But she is destined to be a victim to the conventions which she shames. Educated to enable her to fill with propriety her new situation, and led by gratitude to form a devoted love for *Dalton*, she is doomed at last to find that her instructress was his wife, and that she herself is the daughter of a rascally lawyer. This *dénouement* is unsatisfactory; nor is the painfulness of the situation much atoned for by the poor girl's closing speech—"My destiny is in the hands of Heaven." The success of the drama is owing to the good writing and good acting; not at all to the interest of the story, or to any skill shown in its structure.

MUSICAL AND DRAMATIC GOSSIP.—Contemporaneously with the performing operations of the London Bach Society noticed by us last week—and which we hope are only the first of a series—the Leipsic Bach Society has issued a prospectus announcing its intention to publish a complete edition of the works of the Cantor of the *Thomas Schule*:—under the direction of a list of members, otherwise a committee, which seems to us more showy in its composition than calculated to prove serviceable. The names of MM. Breitkopf and Härtel, Hauptmann, Moscheles (of Leipsic), Marx (of Berlin), R. Schumann (of Dresden), Spohr (of Cassel), Winterfeld (of Berlin) the learned and accomplished writer on ancient music—are judiciously selected; but what benefit or co-operation, beyond sale and subscription-agency, are to be derived from gentlemen residing in places so distant from Leipsic as Breslau, Emden, Munich?—or so utterly unable to superintend a musical publication as His Excellency the Prussian Ambassador in London? It is hardly within the possibilities that these scattered persons can communicate with each other, far less meet; while the unwieldiness of such a body is calculated to exercise a most unfavourable influence on a publication which should and which must appear regularly. Small is the chance of any of this present generation living to see the completion of an edition of the works of Bach thus undertaken. Nor is our misgiving ascribable merely to the construction of the Society; but also to the voluminousness of matter and to the difficulties of editorship, which can only

be grappled with according to one system, and disposed of by the undivided labour of one qualified and competent musician. The Leipsic Society, however, seems in one matter to have made a wise decision:—we mean by commencing with the vocal works of Sebastian Bach. Of these a uniform edition cannot fail to be welcome. The publication of Bach's instrumental compositions has already advanced largely under the care of M. Peters of Leipsic; and the wisest thing that the new Society could do would be, to arrange their publications in completion of, not in competition with, his,—and, by coming to some understanding and arrangement on the subject, at once to preclude rivalry and prevent waste of labour. In any event, the new project is one full of interest.

We are informed by the *Musical Times* that the Dean and Chapter of Westminster Abbey have lately instituted prizes by way of encouragement to their choir boys; and that an examination recently took place in the presence of the authorities of the cathedral. It was conducted by Sir George Smart, at the request of the organist. The boys were divided into three classes, and the most advanced in each class received a prize.

An advertisement in the same journal acquaints us that the second eight-guinea prize for the best vocal composition given by the proprietors of Novello's 'Part Song-Book,' has been awarded to Miss E. Stirling, of Poplar. We presume that this is the young lady whose organ-playing some dozen years ago excited so much attention, and of whom the public has since lost sight. For the first prize, which was carried off by Mr. Walter C. Macfarren, we are informed that there were no fewer than fifty-eight candidates.—The 'Part Song-Book,' by the way, gives tokens of improvement. In the fourth number is a new setting for four voices of Shakspeare's delicious 'Orpheus with his lute,' by Mr. G. A. Macfarren. This would be a beautiful glee, were not three or four of the passages spoilt by progressions and harmonies the effect of which on the ear is nothing short of cruel. In the second stave of page 47, the passage of contrary motion in the middle parts to the word "*or hearing*" produces harmonies to our ears desperate, and the more to be deprecated since the first idea and general ordinance of the composition are felicitous and elegant.

Prizes for part-songs appear to be growing in fashion. The Sheffield Apollo Glee Club is tempting competition with a promise of ten guineas to be given in reward for the best new composition:—all manuscripts to be sent in before the 1st of September next.

A new concert-room—in connexion, if we mistake not, with one of the spas—is about to be opened in Cheltenham, with some musical state and ceremony.

Miss L. Pyne is said to have accepted an engagement for the winter season at the Italian Opera of Vienna.—Madame Grisi is not going to Russia this winter.

We observe that "the powers that be" in Paris are passing measures to rid the theatres not merely of the prurient trash which has of late been represented there, but also of the success-manufacturers—in other words, the *claqueurs*—whose exactions and audacities have ended in binding managers hand and foot, and in preventing the *vox populi* from accepting or rejecting artist or work of art. It is impossible, supposing that public amusements are to go on, that this abuse should not work its own undoing; but we are glad to see that in the quarter where the plague was nursed into being and activity, sanitary measures are in progress—since the example may tell on this side of the water. With the discouragement of *claque*, the discomfiture of *clique* also must, more or less, keep pace; and we shall have fewer and fewer obstacles thrown in the way of the deserving, by testimonials given at random, by superlatives on solicitation accorded to the mediocre, by "puffs preliminary" of either the chest or of the good heart of the coming *Romeo* or *Giulietta*.

M. Bocage has just been dispossessed of the management of the *Odéon Théâtre* in Paris:—it is said by some of the journals, in consequence of his perpetually producing pieces there calculated to bring the present Government into disfavour.

Holland seems bestirring itself among the musical countries. The fifth meeting of "The Society for the Encouragement of Music" was held the other day in the fine church of Haerlem, with an orchestra and chorus amounting to six hundred persons. One of the days was mainly devoted to idyllic contests betwixt the different local male singing societies of the Low Countries. On the second day a selection of sacred music was performed,—including a Motett by Sebastian Bach, and a Hymn by Mynheer Verhulst, (whose name is beginning to be heard of "outside the dykes"). On the third day Mendelssohn's 'Elijah' was executed. There was also organ-playing—as was, indeed, only fit, the locality considered.

The title of the new opera to be written by Signor Verdi for the early winter season of Trieste is 'Stifellio.'

Sadler's Wells Theatre, it is announced, will be re-opened on Saturday next. It is understood that the tragedy of 'Hamlet' will be the piece then produced. The company, we are informed, has undergone extensive and important alterations. Miss Glyn is re-engaged, and will appear in several new parts.

To Correspondents.—W. W.—W. M. T.—received.

J. L.—This correspondent, who charges us with discourtesy, might very readily see that if our courtesy were taxed to answer privately all such questions as he puts to us, our correspondence must of necessity take the place of our literary duties,—and if publicly, our general readers must be sacrificed by the amount of many of our columns to our particular ones. The rule of not answering is maintained only by making no exceptions.

A Subscriber, Durham.—We cannot do what this correspondent requests,—for reasons which he may readily guess.

TWENTIETH MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

[*From our own Correspondents.*]

The order of proceeding at this Twentieth Meeting of the British Association has followed the old precedents, adapted to the resources and suggestions of the particular locality. The summary of these proceedings is as follows.—On Wednesday, the 31st ult. the General Committee assembled, and the first General Meeting was held in the evening,—as we last week recorded.—On Thursday, business began, as usual, in all the Sections; and in the evening Prof. Bennett delivered a Lecture, in the Music Hall, on the passage of the blood through the minute vessels of animals, in connexion with nutrition.—On Friday an excursion party, to the number of about seventy, started, under the direction of Mr. R. Chambers, to visit Corstorphine Hill and Arthur's Seat. They examined the groovings on the western face of Corstorphine Hill, and the striæ on the sandstone near Ravelstone. They afterwards visited Arthur's Seat and St. Margaret's, where they examined the striated rocks and stones. In the evening there was a Conversazione and promenade in the Music Hall.—We should mention that the Prince's Street Gardens were open at all times to the members of the Association.—On Saturday, no business was done in the Sections,—but the day was devoted to excursions. One to North Berwick and the Bass Rock mustered more than two hundred members. On arriving at North Berwick, Mr. Daniel Wilson led a detachment of this party to the Bass; whilst others passed onward to Tantallon, the ancient stronghold of the Douglases, under the guidance of Dr. Adams and Mr. Seton. They visited, too, the Castle of Dirleton, founded by the great Anglo-Norman house of De Vaux, and said to have been reduced to its present shattered state by the Parliamentary General Lambert. A projected excursion to the Pentland Hills was all but a failure in consequence of some misarrangement about the carriages,—and, as regards the main body of the intending excursionists, resolved itself into a geological ramble round the neighbourhood of Edinburgh,—embracing, of course, the Calton Hill and Arthur's Seat. This ramble was scientifically illustrated by Mr. Maclaren. On the same day, an extra Horticultural Exhibition was held in the Experimental Gardens, Inverleith, to which members of the British Association had free admission.—On Monday afternoon, the General Committee held a meeting for the purpose of fixing the time and place of their next meeting, and of electing the office-bearers for next year: and on the same afternoon, upwards of two hundred members dined together in the Hopetoun Rooms,—Sir David Brewster presiding. In the evening, Dr. Mantell delivered a Lecture on the extinct birds of New Zealand, in the Music Hall, to a numerous audience.—On Tuesday evening, there was a second full-dress promenade and *Soirée* in the Music Hall.—The business of the Sections on the several days will be found detailed in our columns.—On Wednesday, the General Committee assembled to sanction the grants that had passed the Committee of Recommendations:—and in the afternoon of the same day the concluding General Meeting of the Association, for the accustomed ceremonial proceedings, was held.—This meeting brought the proceedings of the Twentieth Congress to a close.

GENERAL COMMITTEE.

MONDAY.

The President in the chair.—Mr. Phillips stated that invitations had been received from the towns of Ipswich, Manchester, Belfast, Hull and Liverpool. Deputations were heard from the various places (and from Leeds in addition), in support of their respective claims; but while all seemed equally anxious for the honour of the visit in 1852, it seemed to be the general opinion that the Association was, to a certain extent, pledged to visit Ipswich in 1851.

The Marquis of Northampton, after enumerating the claims which Ipswich possessed to the visit of 1851, especially in being situated on the eastern coast, and in a part of England not hitherto visited by the Association, moved that the next meeting be held in that town.—Sir R. I. Murchison seconded the motion, which was unanimously agreed to.

On the motion of Dr. Robinson, the ex-President, G. Airy, Esq., the Astronomer-Royal, was appointed President for the next year; and the following parties were appointed office-bearers:—

Vice-Presidents,—The Right Hon. Lord Rendlesham, the Bishop of Norwich, Rev. Prof. Henslow, Rev. Prof. Sedgwick, Sir J. Boileau, Bart., Sir W. Middleton, Bart., J. G. Cobbold, Esq. M.P., and T. B. Western, Esq. Secretaries,—G. Ransome, Esq., C. May, Esq., C. D. Sims, Esq., and G. A. Biddell, Esq. Treasurer,—J. B. Alexander, Esq.

Sir R. I. Murchison proposed that the meeting should be held some time in the month of June; but after some discussion (during which, however, a general opinion was expressed in favour of an early meeting), it was resolved to leave the precise period to the decision of the Council.

The following noblemen and gentlemen were appointed as the Council for the ensuing year:—

Sir H. De la Beche, Prof. E. Forbes, Prof. Graham, Mr. Greene, Mr. Hutton, Mr. Gassiot, Sir C. Lyell, Sir C. Malcolm, Prof. Owen, Mr. G. R. Porter, Mr. Hopkins, Col. Sykes, Prof. Wheatstone, Sir C. Lemon, Sir P. Egerton, Lord Wrottesley, the Duke of Argyll, Dr. Daubeny, Dr. Whewell, Master of Trinity, Rev. W. C. Harcourt, Dr. Robinson, Rev. Dr. Lloyd, Sir W. Jardine, Prof. Faraday, and Sir J. Richardson.

WEDNESDAY.

The General Committee held their final meeting,—the President in the chair. The minutes of the last meeting were read and confirmed.

The following recommendations then received the sanction of the Committee.—

Involving Grants of Money.

The establishment at Kew Observatory, 300*l.*

That Prof. J. D. Forbes be requested to institute a series of experiments, for the purpose of testing the results of the Mathematical Theory of Heat; that Prof. Kelland be requested to co-operate with him; and that 50*l.* be placed at the disposal of Prof. Forbes for the purpose.

That the Committee for Superintending the Publication of the Tabular Forms in reference to Periodical Phenomena of Animals and Plants be continued, with 5*l.* at their disposal.

That Prof. E. Forbes and Mr. Bell be requested to continue their assistance to Dr. T. Williams in his researches on the Annelida, with 10*l.* at their disposal.

That the Committee on the Vitality of Seeds be requested to continue their attention to that subject, with 11*l.* at their disposal.

That a Committee, consisting of Mr. R. Hunt, Dr. G. Wilson and Dr. Gladstone, be requested to investigate the influence of the solar radiations on chemical combinations, electrical phenomena, and the vital powers of plants gro-

ing under different atmospheric conditions, with 50*l.* at their disposal.

That Dr. Smith be requested to continue his investigation on the Air and Water of Towns, with 10*l.* at his disposal.

That, as the printed Queries formerly circulated for the purpose of obtaining Ethnological data are now out of print, a new and revised edition of them be issued by Sir C. Malcolm and Dr. Hodgkin, with 12*l.* at their disposal for the purpose.

Involving Application to Government or Public Institutions.

That a Committee, consisting of the President, the Duke of Argyll, Sir R. I. Murchison, Prof. Forbes and Lord Breadalbane, be appointed for the purpose of urging on Her Majesty's Government the completion of the Geographical Survey of Scotland, as recommended by the British Association at their former meeting in Edinburgh, in 1834.

That application be made to the Admiralty for the Publication of the Reports of their Committee on Metals.

That a Committee be appointed by the Council for the purpose of waiting upon Her Majesty's Government, to request that some means be taken to insure to the science of Natural History effective representation in the Trusteeship of the British Museum.

That the Council of the Association be requested to communicate with the Council of the Royal Society, and also with the Government, if necessary, respecting the possibility of relieving the Association from the expense of maintaining the establishment at Kew.

That Her Majesty's Government be requested to institute a Statistical Survey relative to the Extent and Prevalence of Infantile Idiocy, as a measure greatly conducive to the public welfare.

Rules.

That the subject of Geography be separated from Geology, and, combined with Ethnology, to constitute a separate Section, under the title of the Geographical and Ethnological Section.

That in future no Section shall omit to meet on account of Excursions, unless specially so determined in each case by the Sectional Committee.

Reports requested.

Prof. Stokes—On the General Theory of Vibratory Motions in Elastic Media.

Prof. Willis—On Acoustics.

Mr. G. Buchanan—On the Strength of Materials.

Mr. T. Stevenson—On the various modes of constructing Sea Walls, and the actual state of knowledge as to their power of resisting the forces to which they are exposed.

Mr. J. Whitworth—On his Experiments for the purpose of constructing Accurate Standards of Measure.

Dr. H. Cleghorn, Prof. Royle, Messrs. R. Baird Smith and R. Strachey—On the probable effects, in an economical and physical point of view, of the Destruction of Tropical Forests.

Researches, &c.

That the Committee on the influence of Carbonic Acid on the growth of Ferns, be requested to continue their investigations.

That Dr. Percy and Prof. Miller be requested to continue their researches on Crystalline Slags.

That the Committee on Shooting Stars and Auroral Phenomena be re-appointed.

That the Committee on the Instrumental Measurement of Earthquake Waves be re-appointed.

On the recommendation that Dr. Laycock be added to the Committee recommended by Section D to report on the History and Advances in our knowledge of the Anatomy and Physiology of the Nervous System,—it was stated that the recommendation had been accidentally omitted, and that the gentlemen originally appointed were Prof. Goodsir, Prof. Sharpey, and Prof. Allan Thomson. Another report omitted in the same way was, on the History and Advance of Vegetable Physiology; to which Dr. Lindley, Mr. A. Henfrey and Dr. Lankester were appointed.

Miscellaneous.

That two Botanical Works, presented by Prof. Parlatore, be deposited in the Library of the University of Edinburgh.

That the Committee of Members of Legislature who are also Members of the British Association, who were requested to watch over the interests of science, and to inspect the various measures which might from time to time be introduced into Parliament likely to affect such interests—be re-appointed, and that the further steps to be taken in this matter be referred to the Council.

That the Tables of the Distribution (in depth) of Marine Animals, by Mr. M'Andrew, be printed *in extenso* in the volume of Reports of this Meeting of the Association.

That the President of Section A be requested, with such assistance from the Members as he may find desirable, to revise the recommendations which have from time to time been adopted in reference to Mathematical and Physical Science, and to communicate thereon with the Assistant General Secretary previous to the next Meeting.

That the sum now paid for Life Composition and Book Subscription (viz. 10*l.*) be divided into two sums of 5*l.* each, the first sum being a necessary payment by all who compound for Annual Subscription; the latter an optional payment as a special Book Subscription.

That the Committee of Superintendence of the Kew Observatory be continued.

That Major-General Briggs's paper 'On the Aboriginal Tribes of India be printed.'

That for the future the names of officers not attending the meetings of the Association be not published.

That a committee be appointed to communicate with the Pulkowa Observatory on the subject of the next general total eclipse.

That the paper of M. Kupfer be printed for circulation amongst the officers.

The Assistant Secretary called attention to the fact that the Council which meets in London is composed not only of those appointed by the General Committee, but of the officers of the last and next Meetings of the Association.

GENERAL MEETING.

WEDNESDAY.

The final General Meeting was held in the Music Hall, in the afternoon,—and was very numerously attended. The formal business having been gone through,—the customary votes of thanks to the governing bodies, the local officers of the city, and other parties, were passed:—and after a vote of thanks to the President, and its acknowledgment,—the Meeting separated.

THURSDAY.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

President—Prof. JAMES D. FORBES.
Vice-Presidents—Sir T. M. BRISBANE, Bart., Bishop TERROT, Prof. W. THOMSON, Lord WROTTESLEY.
Secretaries—Prof. STEVELLY, Prof. G. G. STOKES, Mr. W. J. MACQUORN RANKINE, Prof. SMYTH.
Committee—Mr. J. C. Adams, Sir David Brewster, Mr. J. A. Broun, Prof. Gray, Mr. J. P. Gassiot, Rev. Dr. Hincks, Rev. Prof. Kelland, Dr. Lee, M. Otto Struve, Mr. F. Osler, Prof. Phillips, Rev. Dr. Scoresby, Prof. Wilson, Mr. J. Scott Russell, Rev. J. B. Reade, Mr. F. Ronalds, Col. Sykes, Lieut. R. Strachey, R.E.

Prof. Forbes, the President, being confined by severe illness, Lord WROTTESLEY, on taking the chair, explained briefly that Reports drawn up at the request of the Association took precedence of all voluntary communications, and called on Mr. F. RONALDS for his Report on the 'Observations and Experiments at the Kew Observatory.'

This Report, which was voluminous and elaborate, detailed the arrangements of the buildings and the improvements which had taken place during the last year; the instruments, and the peculiarities of their construction and late improvements, the most important of which was that, by the use of transparent gelatine paper, a light line could be etched on it exactly corresponding with the curve traced by any of the self-registering instruments, which piece of gelatine paper being then sent to the copperplate printer, he was able to strike off from it any number of copies that might be required for distribution.—Prof. PHILLIPS then gave a sketch of the observations which had been established under the unpaid and invaluable superintendence of Mr. Ronalds since 1842–3, when the Observatory was placed by Government at the disposal of the British Association. He gave a brief description of the manner in which a piece of photographic paper, being carried by clock-work across the direction in which the instrument moved whose changes were to be noted, received a succession of impressions which appeared as a curved line, recording the several indications of the instrument as the time elapsed.—Sir D. BREWSTER wished to suggest to Mr. Ronalds that by taking a negative impression of the positive photographic curve, copies might in a much simpler manner be multiplied to any extent,—as was now practised in this city; and he promised to exhibit specimens on some future occasion to the Section.

'Report on Luminous Meteors,' by the Rev. B. POWELL.—In continuing this Report for the year elapsed, the author acknowledged the communications of several scientific friends; among whom Mr. Lowe, as on former occasions, has been pre-eminent. Dr. Buist favoured him with some from India; but others, though promised, had not arrived in time for the present Report. The tables are now somewhat extended in form. The columns which they comprise are, Date,—Hour,—Magnitude,—Colour,—Train,—Explosive,—Velocity or Duration,—Direction,—Remarks,—Place,—Observer,—and Reference. The time is in general common clock time, and therefore open to much uncertainty, unless otherwise expressed; but in all Mr. Lowe's observations it is Greenwich mean time. The Report contained detailed accounts of some of the more important or interesting displays of luminous meteors.

'On the Laws of the Elasticity of Solids,' by W. J. MACQUORN RANKINE.—The object of this paper is to investigate the relations which must exist between the elasticities of different kinds possessed by a given solid substance, and between the different values of these elasticities in different directions. The different kinds of elasticity possessed by a solid substance are distinguished into three: first, *longitudinal elasticity*, representing the forces called into play in a given direction by condensation or dilatation of the particles of the body in the same direction;—secondly, *lateral elasticity*, representing the force called into play in a given direction by condensation or dilatation of the particles of the body in a direction at right angles to that of the force;—and thirdly, *transverse elasticity* or *rigidity*, being the force by which solid substances resist distortion or change of figure, and the property which distinguishes them from fluids. The author's researches refer chiefly to substances whose elasticity varies in different directions. His first endeavour is to determine the laws of elasticity of such substances, as far as they are independent of hypotheses respecting the constitution of matter,—a method which has not hitherto been followed. The first proposition respecting such substances is the following: *Theorem* 1. In an elastic substance which is homogeneous and symmetrical with respect to molecular action, there are three directions at right angles to each other, in which a longitudinal strain (viz. dilatation or condensation) produces a pressure in its own direction. These three directions are called axes of elasticity. They are the proper directions for the reduction of all molecular displacements and pressures. Their existence has been demonstrated according to various hypotheses as to the constitution of matter; but the truth of the demonstrations is independent of the particular hypotheses. The elasticity of a body, referred to these three axes, is expressed by twelve coefficients—three of longitudinal and six of lateral elasticity, and three of rigidity, which are connected by the following laws:—*Theorem* 2. The coefficient of rigidity is the same for all directions of distortion in a given plane.—*Theorem* 3. In each of the co-ordinate planes of elasticity, the coefficient of rigidity is equal to one-fourth part of the sum of the two coefficients of longitudinal elasticity, diminished by one-fourth part of the sum of the two coefficients of lateral elasticity in the same plane. The investigation having now been carried as far as is possible without the aid of hypotheses, the author determines, in the first place, the consequences of the supposition of Boscovich, that elasticity arises entirely from the mutual action of atomic centres of force. The author denominates bodies so constituted *perfect solids*, and respecting them proves the following propositions:—*Theorem* 4. In each of the co-ordinate planes of elasticity of a perfect solid, the two coefficients of lateral elasticity and the coefficient of rigidity are all equal to each other.—*Theorem* 5. In each axis of elasticity of a perfect solid, the coefficient of longitudinal elasticity is equal to three times the sum of the two coefficients of rigidity for the co-ordinate planes which pass through that axis, diminished by three times the coefficient of rigidity for the plane normal to that axis. Thus, in perfect solids, all the coefficients of elasticity are functions of *three* independent coefficients—those of rigidity. In no previous investigation has the number of independent coefficients been reduced below six. To represent the phenomena of *imperfect* solids, there is introduced the *hypothesis of molecular vortices*, in addition to that of atomic centres; that is to say, each atomic centre is supposed to be surrounded by a fluid atmosphere, retained round the centre by attraction, and diffused from it by the centrifugal force of revolutions constituting heat. The author has already applied this hypothesis to the theory of the elasticity of gases and vapours, in a paper read to the Royal Society of Edinburgh, and published in their Transactions, vol. xx. Applied to solids, it leads to the following conclusion:—*Theorem* 6. In an imperfect solid, according to the hypothesis of molecular vortices, each of the coefficients of longitudinal and lateral elasticity is equal to the same function of the coefficients of rigidity which would be its value in a perfect solid, added to a coefficient of fluid elasticity, which is the same in all directions. Thus the number of independent coefficients is increased to four.—The rest of the paper is occupied by the deduction of some important consequences from these principles. This paper is intended to form the foundation of the theoretical part of a series of researches on the strength of materials.

Sir D. BREWSTER begged to suggest to Mr. Rankine that by an examination of the action of transparent solids on polarized light, the correctness of these theoretic views might be tested or corrected: and so accurate and simple was this method found

to be of testing the nature of the constraint under which the several elements of a strained body were, that models of pieces of carpentry were now actually constructed in glass, subjected to the kind of strain to which their representatives would be exposed; and the kind and degree at each part rigorously ascertained by polarized light.—Sir D. Brewster then read a letter to the Section, on which he intended to found a motion for the formation of a committee to proceed and examine the state of a tree struck by lightning in this neighbourhood, and report to the Section:—

Edinburgh, July 31.

My dear Sir,—Mr. Wauchope, of Edmonstone, has expressed his wish that members of the British Association should have the first access to the tree which was some time ago struck by lightning; and, provided some other day than Friday be selected, he will, on a day's previous notice, have workmen on the spot to cut it down, or expose the roots, with a view to tracing the electric current downwards, if it be wished.—Believe me, &c.

Professor Forbes. A. Coventry.

M. Martins, now present at the Association, had made some very curious observations on this subject. On some occasions large volumes of steam were seen to envelope growing trees struck by lightning,—no doubt caused by the dispersed sap; and, on one occasion, a tree was split up internally into pieces as small as lucifer matches.—It was suggested to Sir D. Brewster that it was in the committee, not in the Section, that the formation of a sub-committee must originate.

'On Atlantic Waves, their Magnitude, Velocity, and Phenomena,' by Dr. Scoresby.—During *two* passages across the Atlantic in 1847-8, I had opportunities for investigating certain elements respecting deep-sea waves more favourable than had ever before occurred within my experience in navigation. These observations, it should be noted in the outset, and the results deduced from them, were entirely uninfluenced by, and separate from theory. They form but a contribution to this interesting branch of natural phenomena; but I offer them the more readily from the circumstance of their entire independency and speciality. It was in our return voyage from America that the highest seas occurred, when the circumstances adapted for interesting observations were singularly favourable; for, whilst the magnitude and the peculiar construction of the upper works of the ship—the Hibernia—afforded various platforms of determinate elevation above the line of flotation for observations on the height of the waves, the direction of the ship's course, with respect to that of waves, was generally so nearly similar as to yield the most advantageous agreement or accordance for observations on their width and velocity. These observations I shall extract, in their order, from my Journal kept during the homeward passage. My first observation worth recording is under the date of March 5, 1848, when the ship was in latitude about 51°, and longitude (at noon) 36° 50′ W.—the wind then being about W.S.W., and the ship's course, true, N. 52° E. At sunset of the 4th the wind blew a *hard gale*, which, with heavy squalls, had continued during the night; so that all sail was taken in but storm-stay sail forward. The barometer stood at 29·50 at 8 P.M., but fell so rapidly as to be at 28·30 by 10 the next morning. In the afternoon of this day I stood some time on the saloon deck or cuddy roof,—a height, with the addition of that of the eye, of 23 feet 3 inches above the line of flotation of the ship,—watching the sublime spectacle presented by the turbulent waters. I am not aware that I ever saw the sea more terribly magnificent. I was anxious to ascertain the height of these mighty waves; but found almost every wave rising so much above the level of the eye, as indicated by the intercepting of the horizon of the sea in the direction in which they approached us, as to yield only the *minimum* elevation, and to show that the great majority of these rolling masses of water possessed a height of considerably *more* than 24 feet (including depression as well as altitude,) or, reckoning from the mean level of the sea, of *more* than 12 feet. Exposed as the situation was, I then adventured to the larboard paddle-box, which was about 7 feet higher, where the level (as ascertained afterwards at Liverpool, allowance being made for the alteration in the draught of water of the ship,) was 24 feet 9 inches above the sea. This position, with 5 feet 6 inches, the height of my eye, gave an elevation altogether of 30 feet 3 inches for the level of the view then obtained,—a level, it should be remarked, which was very satisfactorily maintained during the instants of observation, because of the whole of the ship's length being occupied within the clear "*trough* of the sea," and in an even and upright position, whilst the nearest approaching wave had its maximum altitude. Here, also, I found at least *one half* of the waves which overtook and passed the ship were far above the level of my eye. Frequently I observed long *ranges* (not acuminated peaks) extending 100 yards, perhaps, on one or both sides of the ship,—the sea then coming nearly right aft,—which rose so high above the visible horizon, as to form an angle estimated at 2 to 3 degrees (say 2½°) when the distance of the wave summit was about 100 yards from the observer. This would add near 13 feet to the level of the eye. And this measure of elevation was by no means uncommon,—occurring, I should think, at least once in half a dozen waves. Sometimes peaks of crossing or crests of *breaking* seas would shoot upward at least 10 or 15 feet higher. The *average wave* was, I believe, fully equal to that of my sight on the paddle-box, or more,—that is, $\frac{30}{2}=15$ feet, or upwards; and the *mean highest waves*, not including the broken or acuminated crests, about 43 feet above the level of the hollow occupied at the moment by the ship. Illuminated as the general expanse not unfrequently was by the transient sunbeam breaking through the heavy masses of the storm-cloud, and contrasting its silvery light with the prevalent gloom, yielding a wild and partial glare, the mighty hills of waters rolling and foaming as they pursued us, whilst the gallant and buoyant ship—a charming "sea-boat"—rose abaft as by intelligent anticipation of their attack, as she scudded along, so that their irresistible strength and fierce momentum were harmlessly spent beneath her and on her outward sides,—the storm, falling fiercely on the scanty and almost denuded spars and steam chimney raised aloft, still indicated its vast, but as to us innoxious, power, in deafening roarings,—altogether presented as grand a storm-scene as I ever witnessed, and a magnificent example of "the works of the Lord," specially exhibited to sea-going men, "and his wonders in the deep." In the afternoon of the same day the gale again increased, blowing, especially during the continuance of a much protracted hail-shower, terrifically,—roaring like thunder whilst we scudded before it, causing the ship to vibrate as by a sympathetic tremor, and the tops of rolling waves, too tardy, rapid as was their actual progress, for the speed of the assailing influence, to be carried off and borne along on the aerial wings in a perfect drift of spray! But during the period of these most vehement operations of nature, I was fortunately enabled, from familiarity with sea enterprise, to pursue my observations with entire satisfaction. The next day—March 6—added to the interest of these investigations by developing the character of the Atlantic waves under a long and fiercely-continued influence of a little varying wind. It had blown a heavy gale, violent in the showers, from the north-westward, from Saturday evening the 4th, to the evening of Sunday, from 26 to 30 hours; during the night, too, of Sunday it had again blown hard (abating towards the morning of Monday), and making a total continuance of the storm, in *its violence*, of about 36 hours.* I renewed my observations on the waves at 10 A.M.—the storm having been then subdued for several hours, and the height of the waves having perceptibly subsided. Soon I observed, when standing on the saloon-deck, that ten waves, in one case, came in succession, which all rose above the apparent horizon,—consequently they must have been more than 23 feet, probably the *average* might be about 26 from ridge to hollow. At this period I also found that occasionally (that is, once in about four or five minutes,) three or four waves in succession, as seen from the paddle-box, rose *above* the visible horizon,—hence they must, like those of the preceding day, have been 30 feet waves. But one important *difference* should be noted—viz. that they were of no *great* extent on the ridge, presenting, though more than mere conical peaks, but a moderate elongation. Another subject of consideration and investigation, on this occasion, was the period of the regular waves overtaking the ship, and the determination, proximately, of the actual width or intervals, and their velocity. 1. The ship was then going *nine* knots only, the free action of the engines being greatly interfered with by the heavy sea running, and the lines of direction of the waves and the ship's course differed about 22½ degrees, the sea being two points on the larboard quarter,—in other words, the true course of the ship was east; the direction *from* whence the sea came was W.N.W. 2. The period of regular waves, in incidental series, overtaking the ship were observed as follows:—

Waves.	Min.	Sec.	Mean.
20 occupied	5	30	16″·5
10 ,,	2	35	15 ·5
10 ,,	2	50	17 ·0
10 ,,	2	45	16 ·5
8 ,,	2	16	17 ·0
General average....			16 ·5

3. The length of the ship was stated to be 220 feet. The time taken by a regular wave to pass from stern to stem appeared, on a mean of several observations, to be about six seconds. Hence 6″ : 220 feet (the width passed over in that time) :: 16·5 feet to 605 feet (the width passed over betwixt crest and crest.) But this extent, by reason of the obliquity of the direction of the waves to the course of the ship, is found to be elongated about 45 feet, reducing the probable mean distance of the waves to 559 feet. Independently of this process, I had previously estimated the distance of the wave crests, ahead and astern when the ship was in the hollow, as I stood near the centre of the ship's length on the paddle-box, at 300 feet each way, by comparing the intervals betwixt my position and the place of the wave-crest, with the known length of the ship. This comparison frequently re-considered and repeated, subsequently yielded, in much accordance with the former, a total width, in the line of the ship's course, of about 600 feet. 4. But the total distance betwixt the crests of two waves, then reckoned at 550 feet, a distance passed by the wave in 16·5 seconds of time, by no means indicates, it is obvious, the real velocity of the wave, as the ship meanwhile was advancing nearly in the same direction at the rate of nine knots, that is, nine geographical miles, or (6,075·6 feet × 9 =) 54,680·4 feet per hour, or 15·2 feet per second. During the time, therefore, of a wave passing the ship = 16·5″, the ship would have advanced on its course 16·5 × 15·2 = 250·6 feet. Reducing this for the obliquity of two points we have 231·5 feet to be added to the former measure, 559 feet, which gives 790·5 feet for the actual distance traversed by the wave in 16·5 seconds of time, being at the rate of $\left(\frac{3{,}600'' \times 790{\cdot}5}{16{\cdot}5} =\right)$17,251·7 feet, or 32·67 English statute miles per hour. To know how far this result is but proximate, it should be considered that, of the several elements employed in the calculation, all but one might be deemed accurate. The interval of time occupied by the transit of a wave with respect to the position of the ship, the *direction* of the ship's motion with relation to that of the waves, and the speed of the ship through the water,—may all be recorded as, essentially, accurate. The element in doubt is that of the average distance from summit to summit of the waves. This distance, it has been seen, was, by a twofold process of observation or comparison accordantly assumed. The value of the judgment derived from rapid comparison of measures by an eye accustomed to such estimations is, it should be observed, far higher than might be generally considered. The practical military commander or engineer officer is able to make, by mere inspection of the ground before him, remarkably close estimates of spaces and distances. When engaged in the Arctic whale fishery, I was enabled, from habit and comparison of unmeasured spaces with known magnitudes, to estimate certain distances with all but perfect accuracy. Thus, as to a circumstance in which we were most deeply interested—the near approach of a boat to a whale—I found it quite practicable, whenever the pursuing boat approached within twice or thrice its length (except when the position was near end on) to estimate the distance to less than a yard. Now, the means of comparison by the eye as to the estimation of the breadth of the Atlantic waves, was that of the ship's length of 220 feet. When the ship was fairly in the

* The barometer on Saturday, at 8 P.M., was at 29·50; at 6 A.M. of Sunday it had fallen to 28·30, being 1·2 inches in 10 hours. At 6 P.M. of the latter day it had risen to 30·00 inches.

middle of the depression betwixt two waves it was assumed, with reference to this known measure, that something obviously less, but not greatly so, than the ship's length, was the distance of each of the two waves then contemplated—giving a total width of about 600 feet. But the comparison of the time required by a wave to pass from stem to stern, with the average time of transit of an entire wave, yielded a much better result; and, on much consideration of the subject, I am inclined to believe that the estimate is a tolerably close approximation to the truth. It should be observed, too, that as the headway of the ship, in the direction of the course of the wave—being a known quantity—it was favourable to the accuracy of the estimate. For, assuming an error in the width of the waves to have occurred, say to the amount of one-twelfth of the whole, or 49 feet—the effect upon the calculated velocity of the wave would have been only about a sixteenth, or 2·16 miles per hour. The form and character of these deep-sea waves became at the same time interesting subjects of observation and consideration. In respect to form, we have perpetual modifications and varieties, from the circumstance of the inequality of operation of the *power* by which the waves are formed. Were the wind perfectly uniform in direction and force, and of sufficient continuance, we might have in wide and deep seas waves of perfectly regular formation. But no such equality in the wind ever exists. It is perpetually changing its direction within certain limits, and its force too, both in the same place and in proximate quarters. Innumerable disturbing influences are therefore in operation generating the varieties more or less observable in natural sea waves. In regard to my own observations of the actual forms of waves, nothing particularly new could be expected from an inquiry of this kind in regard to phenomena falling within the perpetual observation of seagoing persons; yet, at the risk of stating what might be deemed common, I will venture to transcribe from my notes made with the phenomena before me, the leading characteristics which engaged my attention. During the height of the gale (March 6th) the *form* of the waves was less regular than after the wind had, for some time, begun to subside. Though in many cases when the sea was highest the succession of the primary waves was perfectly distinct, it was rather difficult to trace an identical ridge for more than a quarter to a third of a mile. The grand elevation in such case sometimes extended by a straight ridge or was sometimes bent as of a crescent form, with the central mass of water higher than the rest, and, not unfrequently, with two or three semi-elliptical mounds in diminishing series, on either side of the highest peak. These principal waves, too, it should be noted, were not continuously regular, but had embodied in their general mass many minor, secondary and inferior waves. Neither did the great waves go very prevalently in long parallel series like those retarded by shallow water on approaching the shore; but every now and then changed into a bent cuneiform crest with breaking acuminating peaks. On the following morning (March 7), after a second stormy night, wind S.S.W. (fine), we had a heavy and somewhat cross sea (from the change of wind from W.S.W. to S.S.W). But the almost unabated magnitude of the more westerly waves indicated a continuance of the original wind at some distance astern of us. The gale had moderated at daylight, and the weather became fine; but as the sea still kept high, its undulations became more obvious and easily analyzed. At three in the afternoon, when about a third part of the greater undulations averaged about 24 feet from crest to hollow, in height, these higher waves could be traced right and left as they approached the ship to the extent of a quarter of a mile on an average, more or less. Traced through their extent the ridge was an irregular roundbacked hill, precipitous often on the leeward side of waters. The undulations, indeed, as to primary waves, consisted mainly of these roundbacked masses, broken into or modified by innumerable secondary and smaller waves within their general body. The time in which these waves passed the ship was now, on an average, about 15 seconds, the ship's speed being increased from 9 to 11 knots, and the obliquity of the ship's course to the direction pursued by the waves was 3 points. On the 9th, two days after the above condition of the waves—whilst the sea yet ran high—few waves could be traced, continuously, above 300 or 400 yards in extent along the same ridge. The crests often curled over, but none so as to reach the height of a 30-feet wave, and broke for a wide space, estimated at 50 to 100 yards in continuity.

Miscellaneous Notes and Suggestions.—The mode adopted in these researches of finding the *height* of wave is, I believe, quite satisfactory, and, observed with care and with relation to numbers or proportion of waves, as accurate as need be. The depression of the horizon in respect to the elevation of the observer is too small to form even a correction. As the horizon from the paddle-box $\frac{30}{2} = 15$ feet, had only a depression of 3′ 49″, the distance of the visible horizon, as seen from this elevation, would be 4·45 statute miles, and the actual depression in feet due to the distance of the summit of the wave when the ship was in the midst of the hollow, could only be 0·18 foot or 2·16 inches. Other modes of determining the width of a wave—or the extent betwixt summit and summit—much preferable to that described (the only available one I could devise) might easily be adopted where the management of the ship was in the hands of the observer. In steam ships the simplest mode for high seas, perhaps, would be, altering the speed of the ship when going in the direction of the wave or against the wave; the ratios of the times of transit of wave-crests, under different rates of sailing of the ship might yield results very close to the truth. In moderate sized waves the plan adopted by Capt. Stanley—whose observations I met with before this meeting—seem satisfactory. But in calms, or moderate weather after a storm,—that is, for the determination of the velocities of less elevated waves—a variety of processes might be available.

The author referred, in conclusion, to the *forms* of wave crests, and heights, modified by crossings, interferences, and reflections.

Mr. Scott Russell felt a familiar interest in the results of these observations. The Section was aware that great doubts existed as to the actual heights of the waves of the open ocean. It was now past all doubt that waves 24 feet high, 30 feet high, 43 feet high, and with the swelling crest even exceeding 45 feet high, actually existed and were observed. From the observations which he had conducted many years since, he had ventured to draw up a table predicting the velocities of sea waves up to even 1,000 feet from trough to crest in length. Although the apparatus which he had used did not enable him to experiment on waves which exceeded 16 inches in length,—yet from these pigmy waves it was most interesting to see how accurately the law was obtained; for in his table the velocity of a wave whose length was 600 feet was set down at 30 or 31 miles per hour. Dr. Scoresby's actually observed velocity for this wave was 32 miles and a fraction.—Lord Northampton begged to remark that this was one of the many instances of the value of the British Association as a handmaid to science. It brought together two such gentlemen as Mr. Russell and Dr. Scoresby, and showed the accuracy of the laws deduced by one from experiments conducted on a microscopic scale, by the test of others observed amid the sublime scene of the great Atlantic.

'On Metallic Reflexion,' by Prof. G. G. Stokes.—The effect which is produced on plane-polarized light by reflexion at the surface of a metal shows that if the incident light be supposed to be decomposed into two streams, polarized in and perpendicularly to the plane of reflexion respectively, the *phases* as well as the intensities of the two streams are differently affected by the reflexion. It remains a question whether the phase of vibration of the stream polarized in the plane of reflexion is accelerated or retarded relatively to that of the stream polarized perpendicularly to the plane of reflexion. This question was first decided by the Astronomer Royal, by means of a phenomenon relating to Newton's rings, when formed between a speculum and a glass plate. Mr. Airy's paper is published in the Cambridge Philosophical Transactions. M. Jamin has since been led to the same result, apparently by a method similar in principle to that of Mr. Airy. In repeating Mr. Airy's experiment, the author experienced considerable difficulty in observing the phenomenon. The object of the present communication was to point out an extremely easy mode of deciding the question experimentally. Light polarized at an azimuth of about 45° to the plane of reflexion at the surface of the metal was transmitted, after reflexion, through a plate of Iceland spar cut perpendicular to the axis, and analyzed by a Nicols's prism. When the angle of incidence was the smallest with which the observation was practicable, on turning the Nicols's prism properly the dark cross was formed almost perfectly; but on increasing the angle of incidence, it passed into a pair of hyperbolic brushes. This modification of the rings was described and figured by Sir D. Brewster, in the Philosophical Transactions for 1830. Now, the question at issue may be immediately decided by observing in which pair of opposite quadrants it is that the brushes are formed. In this way the author was led to Mr. Airy's result, namely, that as the angle of incidence increases from zero, the phase of vibration of light polarized in the plane of incidence is *retarded* relatively to that polarized in a plane perpendicular to the plane of incidence.

'On a Fictitious Displacement of Fringes of Interference,' by Prof. G. G. Stokes.—The author remarked that the mode of determining the refractive index of a plate by means of the displacement of a system of interference fringes, is subject to a theoretical error, depending upon the dispersive power of the plate. It is an extremely simple consequence (as the author showed) of the circumstance that the bands are broader for the less refrangible colours, that the point of symmetry, or nearest approach to symmetry, in the system of displaced fringes is situated in advance of the position calculated in the ordinary way for rays of mean refrangibility. Since an observer has no other guide than the symmetry of the bands in fixing on the centre of the system, he would thus be led to attribute to the plate a refractive index which is slightly too great. The author has illustrated this subject by the following experiment:—A set of fringes produced in the ordinary way by a flat prism were viewed through an eye-piece, and bisected by its cross wires. On viewing the whole through a prism of moderate angle, held in front of the eye-piece with its edge parallel to the fringes, an indistinct prismatic image of the wires was seen, together with a distinct set of fringes, which lay quite at one side of the cross wires, the dispersion produced by the prism having thus occasioned an apparent displacement of the fringes in the direction of the general deviation.

'On the Refractive Indices of several Substances,' by the Rev. Prof. Powell.—Having on former occasions endeavoured to extend the list of observed indices for the standard rays of the solar spectrum given by prisms of different media, by means of an apparatus described, along with the statement of the results, in my report to the British Association, 1839, I now beg to offer to the Association the indices in like manner obtained for the four following. The rare oil of spikenard I received through a friend from the late Mr. Hatchett, by whom it was carefully prepared, perfectly pure; for the other three I am indebted to Mr. N. S. Maskelyne. The results in each case are the mean of several repetitions. In two instances (the oils of lavender and sandal wood) the absorption of the violet rays (as in so many other oils) was such as to render the line H very indistinct; its index is therefore marked as doubtful.—

Medium.	μ for the Standard Rays.						
	B	C	D	E	F	G	H
Oil of Spikenard, Temp. 22 deg. Centig.	1·4732	1·4746	1·4783	1·4829	1·4868	1·4944	1·5009
Oil of Sandal Wood, Temp. 20 deg. Centig.	1·5034	1·5058	1·5091	1·5117	1·5151	1·5231	1·5398 ?
Oil of Lavender, Temp. 20 deg. Centig.	1·4641	1·4658	1·4660	1·4728	1·4760	1·4837	1·4930 ?
Benzole, Temp. 18 deg. Centig.	1·4895	1·4961	1·4978	1·5041	1·5093	1·5206	1·5310

In my report (1839), I stated the impossibility of obtaining measures in chromate of lead from the absence of all appearance of lines, and the entire absorption of the blue and violet portion of the spectrum. I have since thought that in the absence of any determinations of the kind it might not be useless to give the very rough estimates which my former attempts enable me to obtain by means of the absorption of blue glass, which gave a point roughly corresponding to about B, another to D, and the extreme green space visible might be about E. The most refracted of the two spectra (given by the double refraction of the substance) was the worst defined, and in this the part corresponding to D is extremely uncertain. The mean of two sets of observation was as follows:—Prism of chromate of lead, axis of prism perpendicular to axis of crystal, mean angle obtained by reflexion and by measurement = 14° nearly.—

Ray.	1st Spectrum.		2nd Spectrum.	
	Δ	μ	Δ	μ
Extreme red, about B	22°	2·53	26° 30′	2·84
about D	23° 10′	2·55	23° ?	3·00 ?
about E	24° 30′	2·70	30° 30′	3·10

While upon the subject, I may be allowed to remark, that as attempts are now making, with so much promise, for procuring optical glass of a superior quality, it would be highly interesting if specimens were cut into prisms (portions of half an inch cube, or even less, will do, and two sides only need be polished, containing an angle of about 60°), so as to subject the glass to the *very delicate test of the visibility of the finer lines of the spectrum*. I have reason to think that working opticians are not generally aware that in many specimens, *apparently very clear*, only a *few* of the broader lines can be seen, and *very often none*; in Fraunhofer's glass nearly 600 were visible.

FRIDAY.

Prof. FORBES in the chair.

'Notice of the Working of the New Integrating Anemometer during the past year,' by Mr. FOLLET OSLER.—A sheet of *plain paper* placed in the instrument under a registering pencil is moved forward by rotating hemispherical fans, at the rate of one inch for every ten miles of air that passes; this same pencil, having a lateral motion given to it by a vane, records the point of the compass from which the wind blows, and a clock hammer descending every hour strikes its mark on the margin of the paper to express the time. Thus, in a *single line* are given, firstly, the length of the current; secondly, the direction of it; and thirdly, the time occupied in passing a given station marked hourly or at any shorter interval that may be desired.

'On the Magneto-optic Properties of Crystals, and the Relation of Magnetism and Diamagnetism to Molecular Arrangement,' by Messrs. J. TYNDALL and HERMANN KNOBLANCH.—During the investigation carried on more than one hundred natural crystals had been examined. The results were thus briefly summed up:—We have on the one side four new forces assumed,—the optic attractive force and the optic repulsive force, the magno-crystallic force and the magneto-crystallic force; and on the other side no new force whatever, but simply that modification of existing forces which we have named electro-polarity. By attention to the compression of amorphous bodies, every single experiment cited in proof of these four forces can be reproduced. Exactly the same can be exhibited with wax, dough, artificial layers, gutta percha and ivory. The alternative then appears to be, either to explain the action of these substances by the assumption of optic and crystallic forces, or to explain magno-crystallic action by electric polarity.

This paper gave rise to a very animated discussion.—The PRESIDENT said, that although he was ready to admit that Mr. Tyndall's theory was most ingenious, and the arguments and experiments by which he sustained his views were apparently well conceived and sound, yet time must be given to weigh them well before a satisfactory conclusion could be reached.—Prof. THOMSON thought that Mr. Tyndall's views would be found to be substantially consonant with Dr. Faraday's and the theory of Poisson.

Mr. J. A. BROUN presented papers 'On Magnetic Forces.'—His first paper related to 'The Effects of Height in the Atmosphere upon the Diurnal Variation of the Magnetic Declination.' He had two stations of observation: the first, the low level, being at Makerstoun, and the second, the high station, at the top of one of the highest of the Cheviots, at an elevation of 2,650 feet. His conclusions were, that the diurnal ranges did not differ one-tenth of a minute.

The ASTRONOMER ROYAL considered the experiments important, and suggested that there should be two stations of reference,—one directly below the higher station.—Prof. W. THOMSON suggested the making observations on the variations of the vertical force.—Mr. BROUN stated the difficulties of doing this; and the ASTRONOMER ROYAL said he had quite overcome those difficulties.

'On the Construction of the silk Suspension Threads for the Declination Magnetometer,' by Mr. J. A. BROUN.—Silver wires had been used in the Russian declinometers, but expansion impaired their accuracy. Mr. Broun tried three threads prepared by the methods of Cassini, Nervander, and by his own method, and had found that his own process was at least twice as good as Nervander's, and thrice as good as Cassini's.

'On Mechanical Compensations for the effect of Temperature on the Bifilar and Balance Magnets,' by Mr. J. A. BROUN.

'On the Polarizing Structure of the Eye,' by Sir D. BREWSTER.—The author said that when he sat down to this paper he was not aware that Prof. Stokes was intending to make the communication which was placed next on the list—as his was an attempt to account by the polarizing structure of the eye for the phenomena of Haidinger's brushes, which would be explained to them immediately by Mr. Stokes. He would, therefore, confine himself to showing that the eye contained within itself amply sufficient to account for the phenomenon, because constituting the eye itself an ever ready polariscope or analyzer of polarized light.—He proceeded by diagrams to show that the crystalline lens of the eye, its posterior enclosing membrane, with the concave parallel membranes immediately in front of the retina, which together acted similarly to a number of water crystals placed one within the other, constituted a polarizing apparatus, which by analyzing the polarized light from the blue sky, would give two blue skies, bounded by hyperbolic curves, with an interposed space of a yellow of the third order, or a brownish yellow, which would constitute the brushes, or bouchals, of Haidinger. One only difficulty still confronted him in this explanation, viz., that it ought to turn round the brush 45° from the plane of polarization,—in which plane, on the contrary, the brush was found to arrange itself.

'On Haidinger's Brushes,' by Prof. G. G. STOKES.—It is now several years since these brushes were discovered, and they have since been observed by various philosophers; but the author has not met with any observations made with a view of investigating the action of different colours in producing the brushes. The author's attention was first called to the subject by observing that a green tourmaline which polarized light very imperfectly enabled him to see the brushes distinctly, while he was unable to make them out with a brown tourmaline which transmitted a much smaller quantity of unpolarized light. He then tried the effect of combining various coloured glasses with a Nicols's prism. A red glass gave no trace of brushes. A brownish yellow glass, which absorbed only a small quantity of light, rendered the brushes very indistinct. A green glass enabled the author to see the brushes rather more distinctly than they were seen in the light of the clouds viewed without a coloured glass. A deep blue glass gave brushes of remarkable intensity, notwithstanding the large quantity of light absorbed. With the green and blue glasses the brushes were not coloured, but simply darker than the rest of the field. To examine still further the office of the different colours in producing the brushes seen with ordinary daylight, the author used a telescope and prism, mounted for showing the fixed lines of the spectrum. The sun's light having been introduced into a darkened room through a narrow slit, it was easy, by throwing the eye-piece a little out of focus, to form a pure spectrum on a screen of white paper placed a foot or two in front of the eye-piece. On examining this spectrum with a Nicols's prism, which was suddenly turned round from time to time through about a right angle, the author found that the red and yellow did not present the least trace of brushes. The brushes began to be visible in the green, about the fixed line E of Fraunhofer. They became more distinct on passing into the blue, and were particularly strong about the line F. The author was able to trace them almost as far as the line G; and when they were no longer visible the cause appeared to be merely the feebleness of the light, not the incapacity of the greater part of the violet to produce them. With homogeneous light the brushes, when they were formed at all, were simply darker than the rest of the field, and as might have been expected did not appear of a different tint. In the blue, where the brushes were most distinct, it appeared to the author that they were somewhat shorter than usual. These observations account at once for the colour of the brushes seen with ordinary daylight. Inasmuch as no brushes are seen with the less refrangible colours, and the brushes seen with the more refrangible colours consist in the withdrawal of a certain quantity of light, the tint of the brushes ought to be made up of red, yellow, and perhaps a little green, the yellow predominating, on account of its greater brightness in the solar spectrum. The mixture would give an impure yellow, which is the colour observed. The blueness of the side patches may be merely the effect of contrast, or the cause may be more deeply seated. If the total illumination perceived be independent of the brushes, the light withdrawn from the brushes must be found at their sides, which would account, independently of contrast, both for the comparative brightness and for the blue tint of the side patches. The observations with homogeneous light account likewise for a circumstance with which the author had been struck, namely, that the brushes were not visible by candle-light, which is explained by the comparative poverty of candle-light in the more refrangible rays. The brushes ought to be rendered visible by absorbing a certain quantity of the less refrangible rays, and accordingly the author found that a blue glass combined with a Nicols's prism enabled him to see the brushes very distinctly when looking at the flame of a candle. The specimen of blue glass which showed them best, which was of a tolerably deep colour, gave brushes which were decidedly red, and were only comparatively dark, so that the difference of tint between the brushes and side patches was far more conspicuous than the difference of intensity. This is accounted for by the large quantity of extreme red rays which such a glass transmits. That the same glass gave red brushes with candle-light and dark brushes with daylight, is accounted for by the circumstance that the ratio which the intensity of the transmitted red rays bears to the intensity of the transmitted blue rays is far larger with candle-light than with daylight.

'On some Phenomena of Mirage on the east Coast of Forfarshire,' by the Rev. C. F. LYON.—He had noticed the Red Head at Montrose, distant twenty-five miles from St. Andrews, assume a square form, then notched, then double notched. The outlines of the sea had risen up with angular corners, and pieces of the sea seemed raised up as if seen through unequal glass.

Dr. SCORESBY had seen many such peculiarities. They occurred chiefly at seasons when the temperature changes suddenly from cold to heat, thus giving rise to inequalities in the density of atmospheric strata. Two mirages of the same object were frequently seen, as noticed by the late Dr. Young. I (said Dr. Scoresby) once saw a remarkable case of this kind, the land appearing raised up like basaltic cliffs. I then took a different elevation, by ascending to the top of the house, and was delighted to observe that the phenomenon had wholly disappeared. I came down, and now saw it as formerly. Again I descended to the bottom of the rising ground, and saw nothing unusual.—Mr. HOPKINS thought that proper attention had not been paid to the influence of reflexion, as well as refraction, in such cases.

'Experiments on the Expansion of Glass, Wood and Metals from changes of Temperature,' by Mr. ROBERTS.—He was led to these experiments by finding the published tables of relative expansion of bodies

by heat very incorrect on an occasion when he wished to make a good compensating pendulum. His method was:—he had a stove in which he could heat the rods and bars experimented on to a determined heat, say 130°. These rods, wrapped in listing to protect them from sudden change, were then laid rapidly upon supports along a hand-rail laid sloping on the outside of the building, one end bearing on a fixed stay; a screw adapted to determine the 0·001 of an inch was brought to bear on the upper end of the rod; the time occupied in this part of the operation never exceeded forty seconds. After the rods and bars there cooled the contraction was determined by turning the screw. Mr. Roberts exhibited tables which differed materially from those in common use.

THURSDAY.

SECTION B.—CHEMISTRY, INCLUDING ITS APPLICATIONS TO AGRICULTURE AND THE ARTS.

President—Dr. CHRISTISON, V.P.R.S.E.,
Vice-Presidents—Dr. GREGORY, Dr. TRAILL, Dr. DAUBENY.
Secretaries—Mr. R. HUNT, Dr. G. WILSON, Dr. T. ANDERSON.
Committee—Dr. L. Playfair, Mr. J. P. Gassiot, Prof. Johnston, Dr. J. Stenhouse, Mr. J. P. Joule, Prof. Voelcker, Prof. Blyth, Messrs. S. Ward, T. Pearsall, Prof. Penny, Dr. Gladstone, Mr. A. Kemp, Dr. D. Maclagan, Messrs. J. Tennant, J. Young, H. L. Pattinson, H. C. Sorby, Dr. Schunck, Prof. Williamson, Dr. R. D. Thomson, Dr. Andrews, Prof. A. Fleming.

'A few unpublished Particulars concerning the late Dr. Joseph Black,' by Dr. G. WILSON.—Dr. Wilson exhibited Dr. Black's pneumatic trough, with which he showed his experiments on fixed air; his balance, and some other relics of this great man.

'Report on the Influence of Carbonic Acid on the Growth of Ferns,' by Dr. DAUBENY.—This was merely a statement that the inquiry on this subject was still in progress, although no very satisfactory results had as yet been arrived at. The ferns were now growing in an atmosphere containing one per cent. of carbonic acid in excess above that ordinarily contained in air; and although it was thought that similar ferns growing under the same conditions, but without carbonic acid in excess, were the most luxuriant,—it appeared that they thrived well in this artificial atmosphere.—Mr. R. HUNT explained that he was not prepared to furnish a report at this meeting, owing to the great uncertainty which appeared to surround the inquiry. He stated that he found the diversified influences of light materially to affect the quantity of carbonic acid which the plants could absorb without immediate injury. He would still pursue his investigations, and he hoped to arrive at something more definite by the next meeting.

'On the Per-centage of Nitrogen as an Index to the nutritive Value of Food,' by Dr. A. VOELCKER.—The object of this paper was to show, that the usual estimation of the nutritive qualities of an article of food is frequently attended with inaccuracies, which renders it desirable to modify our present methods in this respect in many cases. A circumstance which leads to considerable error is, the presence of ammoniacal salts in the juices of plants. In order to prove experimentally the presence of ammoniacal salts in larger quantities than hitherto suspected, and to avoid the objection that they might result from a partial decomposition of albuminous substances during the analysis, the author chose fungi for his experiments, which are rich in nitrogen and known as being highly nutritious. The species used was *Agaricus prunellus*, a species which is edible, and remarkable for forming most beautiful fairy rings. After having separated all soluble protein compounds by means of basic acetate of lead, which re-agent throws down these completely, the amount of nitrogen still present in the juice of these agarics, in the form of ammoniacal salts, was found to be 0·204 per cent. for the fresh fungi, or 1·82 per cent. for the dry fungi. The whole amount of nitrogen in the same agarics, collected at the same time, determined by combustion, was found to be 0·74 per cent. for the fresh fungi, or 6·61 per cent. for the fungi dried at 212° F. Deducting from the last stated number the quantity of nitrogen found to exist in the juice in the form of ammonia, we find that only 0·536 per cent. of nitrogen in the fresh, or 4·799 per cent. of nitrogen in the dry fungi, exists in the state of protein compounds, and that nearly one-third of the nitrogen obtained by direct combustion exists in the form of ammonia in the juice, or at all events in a form in which the nitrogen adds nothing to the nutritive value of the fungi. The nutritive value of fungi has thus been overrated considerably; and there can be little doubt that the same is the case with many vegetables, which according to the author's experiments contain sometimes considerable quantities of ammonia in the form of ammoniacal salts.

Dr. CHRISTISON remarked that he had long been convinced that there was a considerable fallacy in the methods of determining the value of nitrogen, and he hoped Dr. Voelcker's communication would direct inquiry in a more satisfactory direction.—Dr. DAUBENY made some observations on this paper; and particularly noticed the researches of Prof. Hoffman on the substitution of ammonia, or of its elements, for carbon, which it appeared to him pointed to some laws in connexion with the processes of assimilation of nitrogenous materials by growing vegetables.—Dr. R. D. THOMSON offered some objections to the reception of the doctrine that nitrogen was the principal source of nutrition, since it is found that blood and the other animal constituents contain many other substances.—Dr. L. PLAYFAIR was pleased that Dr. Voelcker had pointed out a source of error in the determination of nitrogen. Having been engaged in examining the dietaries of a large number of extensive establishments, he should lay the results before the Meeting.

'On the Chemical Composition of the Rocks of the Coal Formations,' by Mr. H. TAYLOR.—This was an examination of the composition of the successive series of strata taken principally from "Buddle's Hartly Colliery," in the Newcastle coal-field. It was a paper of great chemical interest,—but too purely technical for our columns.

'On the Tri-morphism of Carbon,' by Mr. H. C. SORBY.—The object of this paper was to show that the great difference between the various states of carbon is produced by its existence in different crystalline forms and volumes.

'On a Peculiar Form produced in a Diamond when under the influence of the Voltaic Arc,' by J. P. GASSIOT.—M. Jaquelin was the first to show that when the diamond is submitted to the high temperature and influence of the voltaic arc, it quickly becomes converted into a black carbonaceous matter having all the appearance of coke:—the diamond when in a native state is an insulator or non-conductor of electricity, but when thus changed into coke it becomes an excellent conductor. At the Chemical Section of the British Association, held at Oxford, in 1847, Dr. Faraday exhibited some specimens of the diamond coke which had been forwarded to him by M. Jaquelin, and subsequently, on the 16th of June 1848, he publicly showed the experiment in London, in the theatre of the Royal Institution. On repeating the experiment a short time since before a few private friends, I obtained a product so totally different from that of M. Jaquelin, that I am induced to bring the subject before this Section, in the anticipation that it may tend to elicit some observations on a phenomenon which at the time attracted the attention of many electricians. The apparatus I used in the experiment consisted of forty series of the usual size of Grove's nitric acid battery,—the terminals were made from two pieces of well burnt box-wood charcoal, that attached to the positive or platinum end of the battery being formed in the shape of a small cup or crucible, in which the diamond was placed,—to the negative or zinc end of the battery, a piece of the same charcoal (but *pointed*) was attached. The experiment was then made in the same form as described by M. Jaquelin, by first making contact with the two charcoal terminals, then bringing the flame in such a position as to cause it to *surround* the diamond;—in less than one minute the diamond as well as the electrode became in a state of intense ignition. The diamond gradually increased in size, rolling about in the heated crucible; when it suddenly expanded, forcing itself upwards on the negative terminal, at which moment I separated the electrodes. The diamond, which was in a state of intense ignition, remained attached to the negative terminal. When cool it exhibited the same state as it now presents. It was expanded to eight or ten times its original bulk. Instead of becoming a black carbonaceous substance, and a good conductor, it has a vitreous white opaque appearance, and remains a non-conductor. It has also a deep circular cavity on that portion which was opposite and nearest to the positive electrode; that part which was in contact with the negative electrode being clearly discernible by a small portion of the box-wood charcoal remaining attached to it. The centre of the cavity appears to be still brilliant, as if that portion of the diamond had not been in a complete state of fusion. In one or two other experiments the diamonds disintegrated, the fragments remaining in a carbonaceous state. Since which I have not had the opportunity of repeating the experiment.

'On some Amalgams,' by J. P. JOULE.—The author had procured an amalgam of iron by precipitating it on mercury by the electrotype process. He had subsequently pursued the research with a view to form definite amalgams by a simple chemical or mechanical process. When mercury was made negative under a solution of sulphate of copper an amalgam of copper was formed which, when fully saturated with copper, was found to be represented by the formula Cu + Hg. The author also exhibited a small apparatus whereby amalgams could be made to endure a pressure of sixty tons per square inch of surface. The superfluous mercury was thus expelled through the openings in the sides of the press, leaving an amalgam of definite chemical composition. In this way he had procured the following compounds.—

Pt	+	2 Hg
Ag	+	2 Hg
Cu	+	Hg
Fe	+	Hg
2 Zn	+	Hg
2 Pb	+	Hg
7 Sn	+	Hg

FRIDAY.

'On a new and ready Process for the Quantitative Determination of Iron,' by Dr. F. PENNY.—The author recommends the employment of the chromate and bichromate of potash for the estimation of iron in the common ores of the metal, and especially for the analysis of the clay-band and black-band ironstone of this country. He was led to the application of these salts in the course of some recent investigations on the materials and products of the manufacture of alum from "alum-shale," in which he was much retarded by the want of a ready method for estimating the oxides of iron. The chromates of potash give very exact results, and possess the great advantage that a much larger quantity of material may be operated on than can be conveniently treated by the usual methods. For practical purposes, he says, the bichromate is to be preferred. The process requires no other apparatus than that commonly used for centigrade testing, which is familiar to all persons engaged in chemical pursuits. It may be easily and rapidly executed, occupying only a fraction of the time required for the process of estimating iron by precipitation as the sesquioxide; and it is not interfered with by the presence of alum and phosphates which usually exist in the ore. The method is based on the well-known reciprocal action of chromic acid and protoxide of iron, whereby a transference of oxygen takes place, the protoxide of iron becoming converted into sesquioxide and the chromic acid into sesquioxide of chromium.

'Report on the present State of our Knowledge of the Chemical Action of the Solar Radiations,' by Mr. R. HUNT.—In this report the author gave an historical sketch of the progress of inquiry on this subject, from the period when Scheele first observed that the chloride of silver was blackened much more speedily by the rays at the blue end of the spectrum than by those at the least refrangible, or red end, to the announcement of the discovery of the sensibility of the iodized tablets to the solar influences by Daguerre and the discovery of the action of gallic acid in the Calotype process by Mr. Fox Talbot. He then proceeded to show the extent of knowledge we had obtained as to the peculiarities of the phenomena which may be summed up as follows. The chemical action of the sun's rays is proved, by its influence on organic and inorganic bodies, to extend over all the luminous rays of the prismatic spectrum — and slightly beyond them at the least refrangible end, and considerably beyond them at the most refrangible extremity. Living organisms and the products of organic life appear to be influenced by light — the luminous power—as distinguished from the purely chemical, or calorific, powers. The vitality of plants is stimulated by light; and although many

functions are performed in the absence of luminous radiations, they appear to be all quickened by its exciting powers: at the same time we have evidence to show that the chemical principle is necessary to the processes of assimilation, and consequently to the production of many of the proximate constituents of plants. The author is of opinion—though he regards the subject as open to serious inquiry—that the processes of germination and budding are essentially influenced by the chemical principle *Actinism*:—that the decomposition of carbon is peculiarly due to the luminous principle; and hence that the formation of wood in plants is a function of their vitality excited by *Light*:—that the developement of the flower is due to a delicate balance of the forces *Actinism* and *Light*, since we find that both the luminous and chemical agencies are very active during the process, and that the ripening of fruit and the perfecting of the healthful conditions of the seed are due to a combination of the calorific and chemical forces—as evidenced in the so-called parathermic rays,—many of the properties of which have been examined by Sir John Herschel and Mrs. Somerville. Returning to the consideration of the influence of the solar rays upon inorganic bodies, the author thought it established beyond a doubt—1st, That the maximum of chemical (actinic) phenomena was to be found where there was the least quantity of light and heat.—2, That as the luminous power increased—either in the spectrum or in natural phenomena—the chemical (Actinic power) diminished, until it came to its minimum, where light—luminous power—existed at its maximum.—3rd, That although the chemical influence extended to the red or heat-giving rays, its operations were materially modified, and to all appearance changed, by the combined operation of the calorific power, and that results standing in direct opposition to those obtained by the pure chemical rays were given by the chemico-calorific rays. In conclusion, the author pointed out the wide field for investigation which was opening up to the experimentalist,—and he showed that, although much had been achieved by the experiments already undertaken, there yet remained a most extensive ground for inquiry which may be considered as absolutely unbroken:—chemical action—vital power—electrical phenomena and phosphorescence were proved to be directly dependent on the solar influences; but we yet want the researches which shall satisfactorily show whether these phenomena are due to one great principle modified by the matter on which it acts, or if they result from the operation of forces combined in action, although very different in their resulting effects.

'On the Influence of Sunlight over the Action of the dry Gases on Organic Colours,' by Dr. G. Wilson.—The object of this communication was to report the result of a series of experiments made this summer on the effect of daylight in modifying the chemical action of eight different dry gases, viz.: chlorine, sulphurous acid, sulphuretted hydrogen, carbonic acid, a mixture of sulphurous and carbonic acid, oxygen, hydrogen, and nitrogen on organic colouring matters.

'On the Condensation of Volume in highly Hydrated Minerals,' by Dr. Lyon Playfair.—This was a continuation of the very extensive examination of the atomic constitution of salts, which has long occupied the author's attention. The remarkable point is the condensation of water in those bodies containing that fluid in combination with the solid matter.—If a salt containing water of crystallization is dissolved in a measured quantity of water, it is found that its solid matter occupies really no space—the water in which it is dissolved increasing in bulk only by the quantity of water which is contained in it.—Numerous instances were adduced of this extraordinary power of solids to condense liquids thus powerfully within the interstitial spaces of which it is composed.

'On the Action of Oxydizing Agents on certain Organic Bases,' by Dr. T. Anderson.

'On the Theory of Etherification,' by Prof. Williamson.—The process by which the remarkable transformation of the elements of alcohol is effected has been the subject of much discussion; and of the two theories which have been devised to explain it, each counts among its supporters many first-rate chemists.—The class of facts upon which the contact theory lays peculiar stress are more physical than those to which the appropriately designed chemical theory refers for its evidence; but there is one point upon which the two differ essentially, and that is the composition of alcohol,—one maintaining that the two products, ether and water, are made from two atoms of alcohol, the other that they are both produced from one atom of double size. This being a difference of a fact, is capable of being decided by experiment.—The examination of the subject by Prof. Williamson cannot be regarded as complete,—and, indeed, it is the author's intention to extend his examination. At present he supposes that the changes are effected by the transfer of homologous molecules in alternately opposite directions; which he has endeavoured to show is the course of continuous action of sulphuric acid in this remarkable process.

MONDAY.

'New Researches on the Conductibility of the Earth,' by Prof. Matteucci.—Although the good conducting power of the earth is at present generally admitted, and is advantageously applied to the construction of electrical telegraphs, it must be confessed that nothing has been hitherto known of the laws and theory of this singular phenomenon. In England, Germany, and Russia, it has been found advisable, for several years past, to form the telegraphic circuit partly with the earth and partly with a metallic wire, instead of forming the whole circuit with metallic wire only. I was, I believe, the first to show, by exact experiments, made in 1844 at Pisa, and by others performed according to my propositions at the Scientific Congress of Milan, that *the resistance of the earth* to the passage of the electrical current, which is sensible in short distances, ceases to increase and remains constant when the distance between the electrodes plunged in the earth has attained a certain length. Having latterly renewed my studies on this subject, I have confirmed and extended in a complete and general manner the conclusions drawn from my former researches; I have also demonstrated the principal result, given above, by different experimental processes. I have compared the resistance of a mixed telegraphic circuit with that of an entirely metallic circuit, containing a length of wire twice as great as that employed in a mixed circuit. I have also formed metallic circuits of very fine brass wires, having the same resistance as the metallic portion of a very long mixed telegraphic circuit; and finally, by making use of long metal wires covered with gutta percha, I have been able to compare the resistance of an entirely metallic circuit with that of a mixed circuit, in which the metallic portion remained constantly the same, and to which were added different lengths of earth. The following are the principal conclusions drawn from experiments which have occupied me for about a year.—The resistance of a layer of earth to the passage of the electrical current varies according to the quantity of water contained in the earth of which it is composed,—according to the specific gravity of that earth,—according to its depth beneath the surface,—according to the nature of the electrodes and extent of their surface. This resistance does not increase with the increased length of the layer of earth; on the contrary, beyond a certain limit of length, which varies according to the different circumstances just indicated, but which in all cases is of little extent, the resistance of a layer of earth *remains constant* whatever be its length. It is unnecessary to say that I could not prove this fact by experiment on circuits exceeding eighty miles in length, such being the average of the telegraphic circuits in Tuscany. In making the experiment near the surface of the soil, it is difficult to plunge the electrodes in earth of exactly the same conducting power; different portions of the surface of soil possessing either better or worse conductibility than that on which I began to operate, it follows that in increasing the distance between the electrodes we may find either an increase or diminution in the resistance of the earth. Likewise, in operating on a long mixed telegraphic circuit, which is not perfectly isolated, owing to the effect of the different derived circuits formed between the posts and the earth, the electric current is stronger near the pile than at a distance, and stronger than in a circuit which is formed only of metal wire equal in length to that which enters into the mixed circuit. This explains the results which I had obtained from my former uncompleted experiments. The resistance of a layer of earth appears to diminish as its length increases only in cases where we meet with other layers of better conducting power. In every layer of earth of a certain *constant* conducting power, the resistance which at first increases very feebly with the increased length of the layer, becomes very soon constant, and continues the same for all the subsequent lengths, however great, on which experiments have been made. Now, it is evident that as the increase of resistance in a long metallic circuit is scarcely perceptible when we add to the circuit, by means of two large electrodes, a thin stratum of water; so we ought to find in the long mixed telegraphic circuits that the resistance of the earth is null or nearly so, since it is equal to that of a thin stratum of water of a very large section. The law of the conducting power of the earth being established, it remains to give the theory of this phenomenon. The opinion of the scientific world is divided on this point. Some explain the good conducting power of the earth by the almost infinite section of the earth compared with the distance of the electrodes; others, again, suppose that the electricities at the two extremities of the pile are dissipated in the earth, in the same manner as the electricity of the conductor of an electrical machine. This second explanation will not bear the slightest examination, nor can it be made to tally with the results of the most elementary experiments relative to the conducting power of the earth. In fact, we cannot on this supposition explain why the resistance of the earth increases at first with the length of the layer; why it varies with the depth and the degree of moisture of that layer; why it changes if the mass of earth interposed between the two electrodes happens to decrease or to be wanting, as I have proved by experiments made in mountainous districts; why the interposition of a portion of earth of a different conducting power produces a variation in the resistance of the entire mass; why this resistance becomes infinitely greater when we keep this layer in a wooden trough separate from the earth, but in communication with it by means of large metallic plates. Finally, according to this explanation, the resistance of the metallic part of a mixed circuit ought to disappear,—a thing which never happens. I think that I may be able to give a satisfactory explanation of the good conducting power of the earth, founding my assertions on very simple experiments and on theoretical views already known. As long ago as 1837, I proved in a memoir published in the *Annales de Physique et de Chimie*, that in operating on a certain liquid mass, very considerable compared with the distance of the electrodes plunged in it, *the length of the intermediate liquid stratum has no sensible influence on the intensity of the current.* I have recently verified this result on a very large scale. I had a wooden case made seven mètres in the side. I keep this case isolated from the earth, and filled with water. Operating on this mass of water, we find that the resistance of a certain stratum of water, variable within certain limits, is independent of its length. In like manner, in studying the conducting power of spherical masses of water varying in diameter from 2^{cm} to 30 or 40^{cm}, I have found that the resistance of these spherical masses of water was the same, and independent of their diameter. I have already said that this result may be deduced from the theory, and this is done as follows:—From the same differential equations, given first of all by Fourier in his celebrated theory of heat, and which Ohm has applied to electricity, suppressing in the latter case the terms which expressed the dispersion of heat in the air, are deduced in the case of the sphere the results which I have obtained by experiments on the propagation of electricity in the earth. Although we are as yet ignorant of the physical value of that variable U which figures in the fundamental equation of Ohm at three partial differentials, which is the same as that of Fourier in the propagation of heat, and although that equation would really be more applicable to the case of the metallic wire which communicates at one extremity with the conductor of an electrical machine in action, and at the other extremity with the earth, than to the case of the electrical current defined by its electro-chemical and electro-magnetical action; it is no less true that a certain number of the phenomena of the electrical circuit are explained by representing the propagation of the electrical current by the same equation given by Fourier in his theory of heat.

Among these phenomena may be placed the fundamental law of the propagation of electricity in metallic wires according to their section and length, and the other more general cases of the propagation of the electrical current, and of derivation, in large metallic plates, or in spherical masses and in the earth, such as they have been found by MM. Kirchhoff and Smaaeen in Germany, and in Italy by my friends Ridolfi and Felici.

The reading of the communication from Prof. Matteucci led to a conversation on the various methods employed by the Electric Telegraph Company and others, and on the question of the investigations of Messrs. Bain and Wheatstone in England, and several experimentalists on the Continent prior to these investigations of M. Matteucci as to the power of the earth to conduct electricity.—Mr. R. Hunt explained that in speaking of the conductibility of the earth it should be distinctly understood that the water contained in the superficial stratum is the conducting medium;—since he has proved that non-metalliferous rocks and dry earth will not conduct an electric current.

'On the Sugar Produce of the South of Spain, chiefly in connexion with the employment of the Acetate of Lead and Sulphurous Acid as purifying agents,' by Dr. Scoffern.—On the southern coast of Spain, in a region limited by Almeria on the east and Malaga on the west, bounded on the north by mountain ranges and on the south by the Mediterranean, is a tract of land which, so far as its climate and productions are concerned, may be aptly denominated tropical. In it the date, palm, indigo, cotton, and sugar-cane flourish with vigour, yielding products equal both in quantity and quality to those of the tropics themselves. The sugar-cane first introduced by the Arab conquerors is not only consumed in large quantities as a dessert, but also gives rise to a considerable manufacture of raw and refined sugar, a circumstance which beyond Spain itself seems to be very little known. There is perhaps no example on record of any operation involving a commercial result attended with such an enormous destruction of material as the operation of extracting sugar from the cane. One portion of this loss is due to mechanical, another to chemical causes. The sugar-cane has been stated by most writers who have found opportunities of practically examining the subject to contain no more than 10 per cent. of solid non-saccharine matter, leaving 90 per cent. of juice to be extracted. Of this 90 per cent., most writers concur in testifying that in practice scarcely 50 per cent. are actually obtained; at least in the British West India possessions. Cane juice itself has usually been stated to contain from 17 to 23 per cent. of crystalline sugar, of which scarcely 7 per cent. in practice is actually extracted. Considerable doubts having been expressed as to these statements of the amount of juice in the cane, and sugar in the juice, I have lately gone through a series of experiments having for their object the settlement of the doubt, and with the result of amply confirming the testimony of other experimenters. Having operated on canes from various parts of this district, by slicing them,—exhausting first by hot water and then by hot alcohol, and finally drying, I obtained as my mean result about 10 per cent. of woody or insoluble matter—whilst the sugar extracted and crystallized ranged from 17 to 23 per cent., as had previously been stated. It would consequently appear that 40 per cent. of juice is actually lost in the practice of our West India workings; and now arises, as a most important consideration, the question as to what extent this loss is inevitable, and to what extent it might have been obviated by altered machinery or improved manipulation. Instead of 50 per cent. of juice extracted, 70 per cent. is much nearer the average amount yielded by the sugar-mills of this coast, although occasionally the result is as high as 75 per cent., and this, in some cases, with mills of very inferior construction. The cane, however, is passed between the rollers of the mill four times, until the refuse or megass, as the pressed cane is called, has been reduced to a state of disaggregation resembling ground tan, whereas the West India cane refuse is represented to be in the form of long strings, a sufficient proof that the pressure applied has been very inadequate. After the cane has finally left the mill it is immediately, in the Spanish sugar regions, subjected to the operation of pressing, sometimes by the agency of a screw, but in many cases by hydrostatic force. By the latter method, I have seen 13 per cent. of juice extracted from megass which had already yielded up 73 per cent. of juice to the mill, thus elevating the total quantity extracted to 86 per cent. out of the original 90, and consequently as a manufacturing operation leaving very little more to be desired. The hydrostatic press I consider to be an apparatus which is indispensable to the economy of every sugar estate:—not only does it largely contribute to the amount of juice extracted,—but what is most remarkable is, the juice resulting from hydrostatic pressure of megass is invariably, so far as my observations have gone, richer in sugar than juice yielded by the mill,—a fact which seems to be only explicable on the supposition that the hydrostatic press in virtue of its great power is enabled to extrude those particles of sugar which microscopic examination demonstrates to exist in the cane in the solid and crystalline form. The subsequent stages of the sugar manufacture as carried on in Spain do not materially differ from those in operation in Cuba, and many other tropical countries. The juice is defecated or purified by lime, skimmed, evaporated to the requisite degree, and poured into earthenware moulds, the contents of which are finally exposed to the operation of claying. In one manufactory, however, witnessed by me, at Almunecar, lime is no longer used on account of its well-known injurious effects on sugar:—no other agent having been substituted in its stead, but sole reliance being placed on the coagulation by heat of albuminous matters present in the juice, and their final removal by skimming. Under this system of manufacture the sugar produced is light coloured, but badly grained, and the unseparated albuminous matters are present in such quantity that every 100 parts of the concentrated saccharine juice as it comes from the teache, or last evaporating pan, only yield 40 parts of crystallized sugar on cooling, the other 60 per cent. remaining in the condition of molasses perfectly uncrystallizable until some adequate means for defecation be had recourse to. The chief object of my residence in this sugar district was to superintend the erection of machinery for manufacturing sugar by means of my own process. The site of our operations is Montril, about forty-five miles south of Granada,—in a manufactory furnished with apparatus of the rudest character. Up to this period (July 9) our own vacuum apparatus has not been sufficiently advanced to enable us to pursue our operations by its aid; nevertheless, owing to the superior defecating power of the sub-acetate of lead, we have, even with the old and rude machinery, obtained a result of more than 16 instead of 7 per cent. of sugar. Our striking teaches, or final evaporating pans, we were under the necessity of removing in order to afford the requisite space for our own machinery; hence we were reduced to the necessity of concluding our process of concentration in a brass pan of conical form and holding about 600 imperial gallons, thus materially increasing the difficulty of the evaporative process. Hitherto only one-sixth per cent. on the juice of sub-acetate has been used,—but I imagine the quantity may be advantageously increased. As filtration is indispensable for the conducting of this process, considerable fear was entertained lest fermentation might supervene. This fear, however, practice has demonstrated to be groundless, inasmuch as we possess in sulphurous acid an agent most antagonistic to fermentation. Another speculative fear was lest danger might arise from the lead employed: this fear, too, practice demonstrates to be entirely without foundation, for not only is the sulphite of lead most easily removed,—but even were it to remain no injury could supervene, inasmuch as this agent is as harmless as chalk.

In continuation:—Observations on the Sulphite of Lead were made by Dr. Gregory,—who stated that he had made experiments on the sulphite of lead formed in this process. He admitted that an infinitely small proportion might still remain in the sugar, but that he considered it quite innocuous. He had indeed fed rabbits and dogs with food which had been united with this sulphite of lead, and the result was that they thrived amazingly, showing no symptom of any of the known effects of lead. Dr. Gregory, also remarked that in testing sugar for lead with the hydro-sulphuret of ammonia iron was often mistaken for the former metal.

Dr. Christison contended that we had no evidence that the sulphite of lead was innocuous. It was true that in cases of poisoning by carbonate of lead sulphuric acid was administered to convert it into the comparatively insoluble sulphate; but this was a case widely different from the slow accumulation of lead upon the system. Dr. Christison adduced some examples of exceedingly small doses of lead being taken in water for more than twelve months before its evil effects became apparent. He, therefore, thought it yet remained to be proved that the sulphite of lead was without action on the system, since we know nothing of the influence of the solvents it would meet with in the system, or of the influences of vital action. Rabbits, he was prepared to say, should be entirely rejected in these inquiries, since he had found that they were not affected by many poisons. Dogs and cats were the only animals which could, from their internal structure be regarded as the representatives of the human system in these investigations.

'Some Observations on the Growth of Plants in Abnormal Atmospheres,' by Dr. J. H. Gladstone and Mr. G. Gladstone.—Whereas oxygen is the most important constituent of the atmosphere so far as animal life is concerned, it is upon the carbonic acid, ammonia, and aqueous vapour that the vegetable world is supremely dependent. The question arises, Does the oxygen and nitrogen of the air play no important part in the process of vegetation? The following preliminary experiments, with a view to the solution of this and similar inquiries, were detailed by the authors. A pansy lived for the length of twenty-four days in an atmosphere of hydrogen, containing 5 per cent. of carbonic acid; one similarly placed in an atmosphere of common air remained healthy for a longer period. Five onions just commencing to sprout were severally placed in carbonic acid, carbonic oxide, coal gas, air containing 8 per cent. of light carburetted hydrogen, and ordinary atmospheric air. The germination of the first two was entirely stopped; while the hydrocarbons appeared considerably to accelerate the growth of the vegetable. The plants in each instance lost weight. A pansy in flower, a young stock, and a grass plant were placed in pure nitrogen gas. The former two soon died, but the grass was left growing a month after the commencement of the experiment. Another pansy was placed in a mixture of oxygen and hydrogen gases in the proportion requisite to form water. In order to imitate the balance that obtains in nature between animal and vegetable life, some flies were introduced, along with some sugar to serve as their food. The experiment was commenced a fortnight since, and the plant, when last observed, was in good condition. Owing to the low specific gravity of the mixed gases, the flies were unable to mount on the wing, or make the usual buzzing noise; but the substitution of hydrogen for nitrogen in the atmosphere had no marked effect upon their breathing, thus confirming the observations of M. Regnault by an instance drawn from the Articulata.

'On the Air and Water in Towns, and the action of Porous Strata on Water and Organic Matter,' by Dr. R. A. Smith.—It is a matter of great importance to find from what source it is best to obtain water for large towns, and how it is to be collected. To these points Dr. Smith particularly directs attention. Regarding the conditions of many springs, which never become muddy, but possess a constant brilliancy and a very equal temperature at all seasons of the year, the author thinks that there is a purifying and cooling action going on beneath. The surface water from the same place, even if filtered, has not the same brilliancy; it has not the same freedom from organic matter, neither is it equally charged with carbonic acid or oxygen gas,—there are other influences therefore at work. The rain which falls has not the purity, although it comes directly from the clouds; it may even be wanting in cleanness, as is often the case. Springs rise through a great extent of soil, and collect a considerable amount of inorganic salts; and it is shown by Dr. Smith that their purity is due entirely to the power of the soil to separate all organic matter, and at the same time to compel the mixture of carbonic acid and oxygen. The amount of organic matter removed in this way is surprising,

and it is a most important and valuable property of the soil. The change even takes place close to cesspools and sewers; at a very short distance from the most offensive organic matter there may be found water having little or none in it. As an agent for purifying towns, this oxidation of organic matter is the most extraordinary, and we find the soil of towns which have been inhabited for centuries still possessing this remarkable power. St. Paul's Churchyard may be looked upon as one of the oldest parts of London, and the water from the wells around it is remarkably pure, and the drainage of the soil is such that there is very little of any salts of nitric acid in it. If the soil, says Dr. Smith, has such a power to decompose by oxidation, we want to know how it gets so much of its oxygen. We must, however, look to the air as the only source, and see how it can come from it. When water becomes deprived of oxygen, it very soon takes it up again,—as may be proved by experiment. This shows us that as fast as the oxygen is consumed by the organic matter it receives a fresh portion, conveyed to it by the porous soil. Several experiments of the following character were given, to show the filtering power of the soil. A solution of peaty matter was made in ammonia; the solution was very dark, so that some colour was perceived through a film of only the twentieth of an inch in thickness. This was filtered through sand, and came out perfectly clear and colourless. Organic matter dissolved in oil of vitriol was separated from it by a thickness of stratum of only four inches. A bottle of porter was by the same process deprived of nearly all its colour. The material of which this filter is made is of little importance. One of the best, according to Dr. Smith, as far as clearing the water is concerned, being of steel filings,—oxide of iron, oxide of manganese, and powdered bricks all answering equally well. This shows that the separation of the organic matter is due to some peculiar attraction of the surfaces of the porous mass presented to the fluid.—This paper was a continuation of Dr. Smith's Report published last year,—and he purposes continuing the inquiry.

'On the relative values of the Dietaries in use by different classes of the Population,' by Dr. Lyon Playfair.—Dr. Playfair has been engaged for some time in an examination of the dietaries adopted in the union houses, schools and other great establishments in this country:—the object of the inquiry being the determination of the most nutritious diet. The result of this inquiry has proved that no system of any value has been adopted by any of the boards controlling our national schools and charities; and hence the high importance is shown of some accurate examination—such as that brought forward by Dr. Playfair—of the value, chemically and physiologically, of the dietaries adopted.

The reading of this paper gave rise to a discussion as to the merits of the hypothesis upon which the reductions of these dietary tables have been made,—and it was argued that we had no distinct evidence to prove that nitrogen alone fairly represented the amount of nutrition contained in an article of diet.

'On the Incrustation which forms in the Boilers of Steam-Engines,' in a letter addressed to Dr. G. Wilson, F.R.S.E., by Dr. J. Davy.—On entering on this inquiry, which I did after my return from the West Indies in December, 1848, and after communicating a short paper to the Royal Society 'On Carbonate of Lime in Sea-water,' it appeared to me desirable to collect as many specimens as possible of incrustation from the boilers of steam-vessels, now so widely employed in home and distant navigation. By application to companies and to friends in our sea-ports, as Dundee, Hull, Southampton, Hayle, Liverpool, Whitehaven, I have succeeded in procuring specimens of incrustation formed by deposition in voyages from port to port, in the British and Irish Channels and the North Sea, between Southampton and Gibraltar, in the Mediterranean and the Black Sea, and in the Atlantic Ocean, between Liverpool and North America, and between Southampton and the West Indies. I am promised specimens from the Red Sea and the Indian Ocean,—but these I have not yet received. The character and composition of the incrustation, whether formed from deposition from water of narrow seas or of the ocean, I have found very similar—with few exceptions, crystalline in structure, and, without any exception, composed chiefly of sulphate of lime; so much so, indeed, that unless chemically viewed, the other ingredients may be held to be of little moment, rarely amounting to 5 per cent. of the whole. From two specimens of incrustation from the boilers of steamers crossing the Atlantic, one of which you sent me, in which you had detected a notable portion of fluorine, judging from its etching effect on glass,—I also procured it, it was in combination with silica; and procured it also so combined from two obtained from steamers navigating our own seas, one between Dundee and London, the other between Whitehaven and Liverpool. Of this I had proof, by covering with a portion of glass or platina foil a leaden vessel charged with about 200 grains of the incrustation mixed with sulphuric acid, and by keeping the glass cool by evaporation of water from its surface, and by supplying moisture for the condensation of the silicated gas by a wet band round the mouth of the vessel. After about twenty-four hours under this process, a slight but distinct deposition was found to have taken place, corresponding to the margin of the vessel,—a deposition such as that produced by silicated fluoric acid gas under the same circumstances. Thus it was not dissipated by heat nor dissolved by water, and yet admitted of removal by abrasion, either entirely or in great part;—the former in the instance of the platina foil, the latter in that of the glass. Besides the ingredients above mentioned, I may add that, in many instances, oxide of iron, the black magnetic oxide, was found to form a part of this incrusting deposit, collected in one or more thin layers, and further, that in some, especially of steamers navigating the narrower and least clear part of the British Channel, the depositions presented a brownish discoloration produced by the admixture of a small quantity of muddy sediment. Incrustations so discoloured, I may remark, are reported to be most difficult to detach. I have said that the incrustations, with few exceptions, were similar in their structure, and that that was crystalline;—it was not unlike the fibrous variety of gypsum of the mineralogists.—The specimens received, as might have been expected, varied very much in thickness, viz., from one line and less to half an inch. I have endeavoured, by a set of queries which I had distributed, to obtain information respecting the exact time in which the incrustations were formed, and under what circumstances; but with partial success only, owing, it may be inferred, to a want of exact observation. In one instance, that of the North American mail-ship Europa, which arrived at Liverpool on the 15th of November, at 4 P.M., having left Boston on the 7th of the same month at 9 A.M., an incrustation was found in her boiler of about one-fiftieth of an inch in thickness; and it is stated that an incrustation of about the same thickness was found on her outward voyage. This example may aid in giving some idea of the degree of rapidity with which the incrustation is produced, at least in the Atlantic, with the precaution of "blowing off" every three hours, and with the "brine pumps" kept in constant work. In other seas, especially contiguous to shores, and more especially of shores formed by volcanic eruptions, it is probable, *cæteris paribus*, the rate of the deposition of the incrusting sulphate of lime will be more rapid. The results of the trials of several portions of sea-water taken up on the voyage from the West Indies to England noticed in the paper of mine already referred to, are in favour of this conclusion. To endeavour to prevent the deposition of the incrusting matter or to mitigate the evil, various methods, it would appear, have been had recourse to,—some of a chemical kind, as the addition of muriate of ammonia and sulphate of ammonia to the water in the boiler,—without success, as might be expected;—others, of a mechanical kind, with partial success,—as the introduction of a certain quantity of saw-dust into the boiler, or the application of tallow, or of a mixture of tallow and plumbago to its inside, to prevent close adhesion, and the more easy separation of the incrusting matter either by percussion, using a chisel-like hammer,—or by contraction and unequal expansion, by means of flame kindled with oakum, after emptying the boiler and drying it. Of all the methods hitherto used, that of "blowing off,"—that is, the discharging by an inferior stop-cock a certain quantity of the concentrated water of the boiler by the pressure of steam, after the admission above of an equivalent quantity of sea water of ordinary density, appears to be, from the reports made, the most easy in practice, the least unsuccessful, and the most to be relied on. But, as in the instance given of the North American steamer, it can be viewed only as a palliation. Considering the composition of the incrusting matter and the properties of its principal ingredient—the sulphate of lime, a compound soluble in water and in sea water, and deposited only when the water containing it is concentrated to a certain degree, there appears to be no difficulty theoretically in naming a preventive. The certain preventive would be the substitution of distilled or rain water in the boiler for sea water. Of this we have proof in the efficacy of Hall's condenser, which returns the water used as steam, condensed, after having been so used:—but, unfortunately for its practical success, the apparatus is described as being too complicated and expensive for common adoption. Further proof is afforded in the fact, that the boilers of steamers navigating lakes and rivers in the waters of which there is little or no sulphate of lime, month after month in continued use, remain free from incrustation. This I am assured is the case with the steamers that have been plying several summers successively on the lake of Windermere. And it may be inferred, that in sea-going steamers in which sea water is used in the boiler,—or, indeed, any water containing sulphate of lime, the prevention of deposition may be effected with no less certainty by keeping the water at that degree of dilution at which the sulphate of lime is not separated from the water in which dissolved. From the few trials I have made, I may remark, that sulphate of lime appears to be hardly less soluble, if at all less, in water saturated with common salt than in perfectly fresh water. This seems to be a fortunate circumstance in relation to the inquiry as to the means of prevention, and likely to simplify the problem. If these principles be sound, their application under different circumstances, with knowledge and judgment on the part of the directing engineer, will probably not be difficult. His great object will be in sea-going steamers to economize the escape of water in the form of steam, and thereby also economize heat and fuel;—also, when fresh water is available to use it as much as possible; and further, to avoid using sea water as much as possible near coasts and in parts of seas where sulphate of lime is most abundant. From the incrustation on the boilers of sea-going steamers, the attention can hardly fail to be directed to that which often forms, to their no small detriment, in the boilers of locomotive-railway engines, and of engines employed in mines and in the multifarious works to which steam power is now applied. These incrustations will of necessity be very variable, both in quantity and quality, according to the kind of ingredients held in solution in the water used for generating the steam. Hitherto I have examined two specimens only of incrustations taken from the boilers of locomotive engines, and a single one only from the boiler of a steam-engine employed on a mine—a mine in the west of Cornwall. The latter was fibrous, about half an inch thick, and consisted chiefly of sulphate of lime, with a little silica and peroxide of iron, and a trace of fluorine. The former were from one-tenth of an inch in thickness to one inch. They were laminated, of a grey colour, and had much the appearance of volcanic tufa; they consisted principally of carbonate and sulphate of lime with a little magnesia, protoxide of iron, silica, and carbonaceous matter—the last two, the silica and carbonaceous matter, probably chiefly derived from the smoke of the engine and the dust in the air. From the engineer's report it would appear that the thinnest—the incrustation of about one-tenth of an inch—had formed in about a week, during which time the locomotive had run about 436 miles, and consumed about 10,900 gallons of water.

'Remarks on the Isomorphous Relations of Silic and Alumina,' by Prof. Chapman.

'On the Proportion of Phosphoric Acid in some Natural Waters,' by Prof. Voelcker.—The object of this paper was to draw attention to a natural source from which many of our fields may be economically supplied with phosphoric acid. Prof. Fownes has shown that traces of phosphoric acid are met with in many rocks of igneous origin, but also in stratified rocks, particularly in limestone

rocks, the presence of phosphoric acid has been indicated by several chemists. The author found the proportion of phosphoric acid in graptolite, from the neighbourhood of Cirencester, amounting to 0·124 per cent., equal to 0·260 of bone-earth, and in Stonesfield slate from the same locality amounting to 0·117, equal to 0·244 per cent. of bone-earth. As water, charged with carbonic acid, is capable of dissolving bone-earth, this important fertilizing substance is found in many natural waters, percolating rocks which contain phosphoric acid. Such waters, therefore, may be applied with advantage for irrigation. The advantages derived from this too often neglected natural source, are strikingly exhibited in the irrigated meadows in the neighbourhood of Cirencester; and it is the opinion of the author that one of the chief causes of the beneficial effects which follow the application of the water for irrigation in this locality, is to be found in the phosphate of lime it contains. In a tea-kettle incrustation formed in a short period by this water, the proportion of phosphoric acid was found to amount to 1·25 per cent., showing a considerable quantity of this acid present in the water. A very hard water from Edinburgh likewise proved to contain phosphoric acid, but its proportion was not so large as that in the Cirencester water, the quantity of phosphoric acid in a boiler incrustation formed by this Edinburgh water being only 0·427 per cent. Sea water also contains phosphoric acid, but the proportion of the latter amounts to mere traces. A quantitative determination of phosphoric acid in the boiler deposit of a Canada steamer gave only 0·0306 per cent., and that in a boiler incrustation of a steamer plying between Dublin and Liverpool 0·0424 as the per-centage of phosphoric acid. In conclusion, the author recommended Swanberg's test, molybdate of ammonia, as a ready means for deducing the presence of phosphoric acid in natural waters.

THURSDAY.

SECTION C.—GEOLOGY AND PHYSICAL GEOGRAPHY.

President—Sir RODERICK I. MURCHISON.
Vice-Presidents—Prof. JAMESON, Sir PHILIP DE GREY EGERTON, Mr. C. M LAREN, Prof. SEDGWICK.
Secretaries—Prof. NICOL, Mr. HUGH MILLER, Mr. A. KEITH JOHNSTON.
Committee—The Duke of Argyll, Capt. Sir G. Back, Messrs. R. Allan, Binney, Dr. Black, Mr. J. Bryce, Count Breunner, The Earl of Cathcart, Mr. R. Chambers, The Earl of Enniskillen, Sir C. Fellows, Prof. E. Forbes, Prof. Hitchcock, Messrs. Hopkins, J. Rigg, J. B. Jukes, Sir C. Lemon, Sir C. Malcolm, Mr. M'Adam, Dr. Mantell, Mons. Martins, The Marquis of Northampton, Mr. J. B. Pentland, Prof. Oldham, Prof. Phillips, Messrs. S. P. Pratt, G. W. Ormerod, Prof. Owen, Prof. Ramsay, Major Rawlinson, Mr. Smith.

'On the Gradual Subsidence of a Portion of the Surface of Chat Moss, in Lancashire, by Drainage,' by Mr. G. W. ORMEROD.—This was the continuation of a paper read at the Swansea Meeting. It was shown by a series of levellings made in the last four years, over an extent of about 200 acres, where drainage was carried on, that a subsidence had taken place to the amount of one foot per annum.

'On the Succession of Strata and Distribution of Organic Remains in the Dorsetshire Purbecks,' by Prof. E. FORBES.—These observations were made in the autumn of 1849, in conjunction with Mr. Bristow. The formation had been previously described in various memoirs by Prof. Webster, Dr. Fitton, Dr. Buckland and Dr. Mantell, but not very minutely; and only twelve species of mollusca and crustacea had been determined,—whereas more than seventy were now enumerated. The strata examined occur along the coast between Weymouth and Dorchester, at Durlstone Bay, near Swanage, and in the quarries at Swindon, Wilts, where the bar of the Purbeck series is exposed, and corresponds exactly with the Dorsetshire beds. After describing these strata, Prof. Forbes says:—It is very remarkable that, whilst the Purbeck can be divided into upper, middle, and lower, each with its peculiar assemblage of organic remains, the lines of demarcation between them are not lines of disturbance, or physical or mineral change. The features which attract the eye, such as the dirt-beds, the dislocated strata at Lulworth, and the cinder-bed, do not indicate any breaks in the distribution of organized beings. The causes which led to a complete change of life three times during the deposition of these freshwater and brackish strata must be sought for, not simply in a rapid or sudden change of their area into land or sea, but in the great lapse of time which intervened between their epochs of deposition. A most striking feature of the mollusca Fauna of the Purbecks is this, so similar are the generic types to those of tertiary freshwater strata and those now existing, that had we only such fossils before us and no evidence of the position of the rocks in which they are found, we should be wholly unable to assign them a definite geological epoch.—A comparison of these fossils with the collections from the Hastings sand and Weald clay leads the author to believe that the Fauna of the middle and upper Wealden series is almost entirely distinct, as far as species are concerned, from those of the lower or Purbeck division. Some of the species reputed identical prove to be distinct; and others are derived from certain anomalous beds near Tonbridge Wells, believed to be true Purbeck strata by the author. The excellent monograph on the Wealden of N. Germany by Dunker and V. Mayer, affords the strongest confirmation of these views, showing that the Fauna of the German Wealden essentially corresponds with the British, and that the organic contents of the Purbecks of the Continent correspond with ours, and differ almost entirely from those of the upper beds.

Sir R. MURCHISON remarked on the small physical extent of the Purbeck strata compared with their palæontological importance, confirming the belief that a whole epoch may be represented by a few feet of deposit.—Prof. OWEN confirmed the inference of Prof. Forbes respecting the connexion of the Wealden with the oolites; of the large Wealden Reptilia, all except the Iguanodon were oolitic and not cretaceous.—Prof. RAMSAY stated that the whole oolitic series had been deposited in a diminishing area, with the land rising to the west, and the last of the series, the Wealden, had been deposited in the estuary of a great river, which must have flowed from the north-west at a time when what is now Wales and Derbyshire was very high land.—Prof. FORBES observed, that no inference as to the age of the Purbecks could be drawn, without the evidence of geological position; the freshwater mollusca and Cyprides differ less from living British species than the living species differed from those of other countries; the Wealden of Scotland was not identical with that of England, but probably belonged to an older period.

'On the Discovery of Palæozoic Fossils in the Crystalline Chain of the Forez, in France, and on Lines of Dislocation between the Lower and Upper Carboniferous Deposits of France and Germany,' by Sir R. I. MURCHISON.—The chain of the Forez (Allies) consisting of slate, schistose and quartzose rocks, has been hitherto considered unfossiliferous; but in a visit made this summer Sir R. Murchison discovered on the banks of the Sichon, remains of Encrinites, Trilobites (*Phillipsia*), shells (*Chonetes* and *Productus*), and corals, all of lower carboniferous forms. These lower carboniferous deposits in many parts of France and in the Rhenish provinces are conformable to the older palæozoic strata, and unconformable to the small overlying patches of true coal-measure,—a fact contrary to the former theory of M. Beaumont, that lines of dislocation afforded good systematic divisions of the strata;—a view which could not be carried out in Russia or the British Isles.

Prof. PHILLIPS stated that in the north of England and south of Scotland the passage of lower carboniferous into coal-measure strata was so gradual, and attended with alternations of rocks and fossils also, that any lines of distinction must be arbitrary. He was not disposed to measure geological time by the evidence of fossils only, since changes in organic life must have depended on changes of physical condition, and these on time; the progress of research had shown that the interruptions in a series were not the most important elements for classification, as M. Beaumont believed, nor the mineral characters the most constant, as Jamieson had formerly taught.—Mr. PAGE said that in the Scotch coal series there was an apparent line of disturbance caused by the intrusion of the trap-rocks, but no real separation; he also remarked that the trap-rocks connected with the lower carboniferous were much less bituminous than those produced after the formation of the coal, and that in this district there were not only alternations of freshwater and marine strata, but also there were true sub-aerial sandstones accumulated by the wind.

'On the Lesmahagow and Douglas Coal Field, near the Head Waters of the Clyde,' by Mr. BRYCE—who exhibited maps and sections.—This coal-field forms a distinct barrier from all the rest, being separated by a barrier of old red-sandstone; it measures about 10 miles by 5 or 6, and contains twelve or fourteen beds of coal, amounting in all to 65 feet, one bed being 15 feet thick, and another 9. In some of the deep valleys the coal is worked on a level. Several beds of clay-ironstone occur, averaging 8 inches thick, and one black band (bituminous ironstone) 11 inches thick, is found throughout the northern part. Fire-clays have been noticed under some of the coal-beds; the largest fault is one of 25 fathoms, running north-west and south-east.

Mr. LANGLAND was of opinion that this coal-field was connected with the Ayrshire coal-field and not separated by old red sandstone as described; throughout the Scotch coal-fields the carboniferous limestone was split up into a number of beds and intercalated with the coal.—Mr. BRYCE, in reply to a question, stated that he considered all the Scotch coal-fields had once been continuous, but had become more or less separated by the outburst of the trap, and in this one instance by an upheaval of the old red sandstone.—Mr. HUGH MILLER said that there were beds of *red* sandstone with coal fossils overlying the coal, and that it was extremely difficult to determine the exact line of junction of the two systems, but such a line did exist, and he believed Agassiz was right in asserting that no species of fish was common to the old red and carboniferous series.—Prof. NICOL stated that Mr. Bryce's sections were exceedingly like Mr. Mills's Berwickshire sections; he thought that all the red sandstone on the north flank of the Lammermuir hills might with more propriety be referred to the carboniferous series.—Dr. FLEMING described some instances in which there were true old red sandstone, with scales of the Holoptychius, followed by numerous alternations of very thin coal seams with carboniferous limestone; some of the trap rock after its ejection appeared to have been arranged by water.

'On the Gold Mines of Darien, Emigration to New Granada, and Canalization of the Isthmus of Darien,' by Dr. CULLEN.—1. The Isthmus is a territory of the Republic of New Granada; its most important part, and that which appears naturally best adapted for communication between the Atlantic and Pacific lies between the Gulf of Darien and the Gulf of San Miguel. Numerous rivers flow into the Bay of Panama on one side, and into the Atlantic on the other; the principal stream is the river Santa Maria, forty miles long, and falling into the Gulf of San Miguel, unobstructed by sand-banks or bars. A few estates are still occupied by the Spanish, but most of the old towns and villages and forts have been long since deserted. About eight miles up the river Santa Maria (or Tuyra) is the village of Chapigana, with a corregidor and about 100 inhabitants, mostly Sambos and Negroes; Mr. Hossack, a Scot, and Don Pepe, a Portuguese, are settled here. A few miles above this village gold occurs abundantly, and about thirty miles above is the town of Yavisa, the capital of the territory and residence of the prefect Don Antonio Baraya. The population is scarcely 100, and the large fort is in good condition, but not garrisoned. The largest vessels can ascend nearly to the Chuquanaqua, a branch of the river Tuyra, a few miles below Yavisa, and up to which the tide extends. This country has been the scene of successful gold-mining under the Spaniards, and of much buccaneering and futile attempts at colonization on the part of the British, from the days of Sir Francis Drake and Basil Ringrose (1680) to Macgregor (1819). In the archives of the treasury of Panama is an account of former mining operations at the Mina Real, on the river Cana (a source of the Tuyra), in the Cerro del Espiritu Santo; the royal quinto or 5 per cent. on this mine averaged for a number of years 3½ millions of dollars per annum, which would give seventy millions per annum for the whole produce; the mining was performed by negroes (never more th n three or four hundred) who hewed out the rock, ground it in mortars by means of oxen, and washed it by a stream of water whilst grinding. The mines were closed in 1685 by command of the king of Spain, although in full operation at the time, on account of the numerous incursions of the buccaneers; they have never been re-opened, and the neighbouring mountains, though rich in gold, have never been worked. Dr. Cullen found the soil on the banks of the streams very fertile, and himself

collected 3lb. of gold at various spots, and several pieces of quartz-rock with veins of gold in it. As an agricultural country, Darien presents the most favourable prospects; its fertile soil, and the rapid growth of the plantain sugar-cane, which arrives at maturity in nine months, make it superior to Demerara, and, though abounding in rivers, it is free from swamps and land liable to inundation; the timber is equal to British Guiana, and game (including alligators and "tigers") is abundant. 2. The government of New Granada affords great advantages to immigrants in the form of employment, loans and grants of land; the average passage to Carthagena or S. Martha is thirty days, and emigrants can go out for 6*l.* per head. The tracts to be colonized consist of high table-lands and elevated valleys (nearly 9,000 feet), with a temperate climate (50° to 80°) all the year. On the table-lands wheat will grow, and in the valleys coffee, cotton, cocoa, sugar-cane, and other tropical crops. The settler has his choice of climate, from the level of tropical vegetation to regions of perpetual snow; the country is scattered over with towns affording supplies, and means of internal and external communication. The population consists of old Creole Spaniards, and the religion is Roman Catholic, but perfect liberty is allowed; the government is a pure democracy. The population of the capital, Bogota, is 60,000. The Cordilleras form a great table-land or platform, on which are piled numerous mountains intersected by valleys in every direction. 3. In conclusion, the writer recommends the rivers Chuquanaqua and Savana as the most direct and feasible mode of communication with the Atlantic; the Savana is navigable by large vessels for ten miles, above which for fifteen miles it would require deepening, and then there remains only ten miles to the Atlantic, where the cutting would be assisted by a ravine. From a mountain on the river Lara, a branch of the Savana, both Atlantic and Pacific were visible. The canal would open near the old Scotch settlement of New Edinburgh at Punto Escoces.

FRIDAY.

'On the Glacial Phenomena of the Neighbourhood of Edinburgh, with some Remarks on the General Subject,' by Mr. R. Chambers.—The author compares the glacial phenomena of Scotland with those of Sweden, with this difference, that in Scotland much of the surface has been masked, and many of the glacial maskings obliterated since the glacial epoch. The trap-districts near Edinburgh often form long and narrow hills, running east-north-east, some of them 800 ft. high, and several of them presenting cliffs to the west, and long gentle declivities on the east. Mr. Chambers described the Corstorphine Hill as a stratum of trap dipping to the west, and with a cliff in a line north and south. In its crest, which rises to 470 feet above the sea, are three or four transverse clefts. On the west surface of the hill, the rock, wherever it is exposed, is found to be rounded (*moutonnée*), smoothed, and grooved. The grooves, and the clefts in the crest of the hill, all lie in one direction, viz., directed to a point to the north of east. There are also, to the east of the hill, long hollows, with rounded intervening swells; and these run in precisely the same direction. At various places between the hill and the sea are seen sandstone surfaces, worn down to a remarkable flatness and smoothness, and in several instances marked with striæ, all pointing in the same direction. In Edinburgh itself, the north side of the Castle rock is smoothed and horizontally grooved, as if by ice passing along the hollow below. In forming the Queen's drive, on the south side of Arthur's Seat, the surface of the rock in the hollow between that hill and "Sampson's Ribs," was found to be wholly smoothed, polished and furrowed and striated in the direction of the passage, which is easterly; on the north side of the same hill, the railway works have also laid bare a prominent mass of rock, polished and striated on its upper and western sides; other rounded and polished rocks occur up to a height of 400 ft. Throughout the Valley of the Forth, from the Pentlands on the one side to the Fife hills on the other, from Linlithgow to Dunbar, the sandstone surfaces, wherever they come up, are likewise smoothed, and in many instances striated in an east-north-east direction. The trap hills rising in this valley are all long and narrow, generally free from abruptness on the sides, often abraded on the west, and generally sloping away gently to the east; the direction here also is always to E.N.E. Surfaces on the Pentlands and in Fife exhibit striation precisely conformable. In short, if a deep ice-flow passed through this valley, it might be expected to produce precisely the phenomena which have been observed. The similar markings in other districts of Scotland were shown for the most part, though not without striking exceptions, to be directed towards the east and south. Mr. Chambers adverted to the theory of debacles, which was started to account for the appearances, as now nearly given up. Ice was generally acknowledged as concerned in producing them, because the appearances were precisely those which the existing glaciers produce. But there was great room for speculation as to the circumstances under which the presumed glacial agent was applied. Mr. Chambers declined theorizing on the subject, but pointed out various conditions which any theory on the subject must explain. (1.) How ice could move over so large a portion of the North American continent, in a direction admitted to be tolerably uniform, allowing for slight deviations, easily explicable, as owing to inequalities in the original surface, and this without any mountain chain to give it forth. (2.) How this ice was capable of ascending slopes and topping mountains of considerable height. (3.) How, in such a valley as that of the Forth, there could be an ice-torrent of undeviating flow for many miles, and deep enough to envelope hills many hundred feet high.

'On peculiar Scratched Pebbles and Fossils from the Boulder Clay,' by Mr. H. Miller.—When examining the boulder clay at Ross and Cromarty in an unsuccessful search for shells, the writer found that not only the large boulders, but even the small pebbles were scratched, though less deeply than the others, unless their texture was unfavourable to receive and retain impressions. Those of limestone, shale, fine-grained sandstone or trap, were scratched and polished, invariably on one, most commonly on both sides, and in four cases out of five the scratchings were in the direction of the longer axes of the pebbles. On the western coast of Scotland, in the Hebrides, in Sutherlandshire, and near Edinburgh, scratched and polished surfaces have been found without boulder clay; but nowhere has boulder clay been discovered without surfaces of this kind below, except in the case of the ordinary brick clays, which are a re-formation of the old materials. It is inferred that the markings on the rocks must have been produced *at the time* the clay was accumulated, or immediately *before;* and as the pebbles throughout the deposit are worn and scratched, it is concluded that the process continued during the entire period of the formation. Proceeding to inquire into the origin of these markings, the writer points out, first, that if these stones had been rolled in a stream the markings would have been transverse, and not longitudinal; and next, that they would not have been scratched so deeply unless held fast, or under great pressure from above. For instance, supposing them to have formed a bank, some fathoms beneath the sea, on which drift ice grounded, the motion of the ice would be greater than that of the loose stones below, and they would be worn on both sides in consequence. In order to obtain a cause sufficiently extensive, we must suppose that the disposition of the Arctic continents has been changed, and that during the British Glacial-period, the Arctic currents, with their thousand icebergs and frozen fields, were spreading over what is now Northern Europe, until arrested by a former gulf-stream. The ice grinding heavily over the submerged surfaces would grind and polish the harder rocks, and reducing the softer materials into clay, propel them in a direction eastward (or S.E.) of their source. At the close of his paper, Mr. Miller exhibited some boreal shells, and fragments of oolite fossils, chalk and chalk-flints from the boulder clay of Caithness, and referred to the labours of Mr. R. Dick, of Thurso, the discoverer in that country of the fossils and chalk, and the collector of most of the shells.

'On the Dispersion of Granite Blocks from Ben Cruachan,' by Mr. W. Hopkins.—The north-east side of Ben Cruachan consists of granite, which is seen also in the large quarries on Loch Etive; angular fragments of this rock, often several tons in weight, and of every smaller size, may be traced to some distance from the mountain; they are seen on the beach at Oban and on the island of Kerrera, extending from the sea up several hundred feet, to the highest part of the island; on the shores of Loch Lomond they are in considerable numbers, and from Tarbet to the head of Loch Long they occur in profusion along that narrow and deep valley; on the shores of Lock Fyne they occur at a considerable elevation, and of large size, all the way up to the head of the valley which extends beyond the Loch. Looking at the country, it would appear that had these blocks been dispersed by glaciers, they would have found an easy route in the direction of Glen Orchy and Taymouth, where none have been detected, whilst their passage to Loch Fyne would be opposed by an insuperable barrier, and their ascent of the island of Kerrera altogether impossible. Mr. Hopkins was disposed to think that several agencies,—glaciers, floating ice, and currents—had taken part in producing the phenomenon in question, for supposing the whole country to have been submerged, with the exception of the higher mountains, any glaciers descending from these mountains would soon become floating icebergs, and the rocks thus dispersed might be still further distributed by currents; in the valley of the Clyde the granite blocks from Cruachan were smaller and more water-worn. The Swiss glaciers originated at a height of a mile or a mile and a half; here the entire altitude of the mountain was only 3,000 feet, and it was impossible that glaciers should form on such an elevation capable of carrying blocks of granite across the sea to the summit of an island three or four hundred feet high, or across a ridge four or five hundred feet high to deposit them in Loch Fyne; but these difficulties would vanish by taking into account the transporting power of floating ice and the further distribution produced by oceanic currents.

'On Scratched Surfaces in the Lake District of Westmoreland,' by Mr. T. Bryce.—The writer stated that Mr. Wakefield, of Kendal, had discovered three or four places near Windermere where glacial action was evident. About a mile south of Staveley a surface had been cleared of the boulder clay fifty feet across for railway purposes, disclosing four rounded and polished surfaces, with grooves running a little west of north; the scratches were directly across the lines of bedding, and the rock (Lower Ludlow) was very hard and tough, requiring to be blown with gunpowder. At the station of the Windermere railway the surface of the rocks was scratched in a direction 24° west of north. At the Borthwick station the perpendicular surfaces of rocks were grooved; and between Kendal and Kirkby Lonsdale there were diluvial ridges ranging with the valleys and coinciding with the direction of the glacial striæ.

The Rev. J. Longmuir exhibited a collection of chalk-flints and greensand fossils from Aberdeenshire, where they are found for a space of ten miles over a granitic region. Flint arrow-heads and stone chisels have been dug up in the fields; and in one place, near Peterhead, the flints lie so thick that not the space of a hand's-breadth is free from them; the flints are always water-worn and globular or oval, of a light grey colour outside and ochrey within. They sometimes contain ventriculites, echinidæ, and bivalve shells, of which Mr. Longmuir has a large collection. Fragments of chalk, greensand, lias, and magnesian limestone have also been obtained from the superficial deposits; the greensand fossils are numerous and like those found in Wiltshire. He considered the chalk fossils indicative of a former extension of that stratum to the east of Scotland,—as it is still found in the south of Sweden, various Danish islands, and the north of Ireland. It was probable that the upper greensand had also extended as far.

Mr. C. Maclaren described some ridges in Glenmersan, Argyleshire, resembling the terminal moraines of a Swiss glacier; they were transverse to the valley, shaped like the roof of a cottage, and composed of unstratified clay, gravel and angular blocks.

The Chairman coincided with Mr. Hopkins in considering it necessary to take into account more than one agency to explain the polished and striated surfaces of rocks; Sir J. Richardson, who was present, had given his opinion that in North America, where glacial phenomena were conspicuous, glaciers had

not, at any epoch, been the cause of these phenomena, but that they were caused by the drifting of icebergs, when the country was submerged.—Mr. J. Smith, of Jordan-hill, stated that in Scotland, scratched rocks were almost universal; in one instance, at Duntrun, Argyleshire, he had noticed a case where the lea side of the scratched rock was at the west; indicating a force from the east. The proofs of submergence during the glacial epoch were also continually multiplying.—Prof. Hitchcock stated that the glacial phenomena of America were like those of Scotland, but not like those of Wales, where he could not resist the impression that he was in a glacial region; in North America there was no evidence of glaciers.—Dr. Fleming called attention to the materials of which the boulder-clay was composed, sometimes finely stratified layers of sand and clay occurred in it, and sometimes horizontal lines of large boulders; on the coast of Aberdeen, 40 feet above the sea, there was a layer of rounded blocks of granite and gneiss in the brick-clay; with chalk-flints and blocks of chalk, caking coal, and wood resembling birch.—Prof. J. Forbes stated that the specimens of scratched rocks from North America were identical with those of Scotland; he was in favour of the comparison with glacial action in Switzerland, but admitted that he could not conceive the existence of a glacier so circumstanced as to produce the markings on Arthur's Seat; the introduction of floating ice-rafts would render the solution more easy.

THURSDAY.

Section D.—NATURAL HISTORY, INCLUDING PHYSIOLOGY.

President—Prof. Goodsir.
Vice-Presidents—Sir J. G. Dalyell, Sir J. Richardson, Dr. R. K. Greville, Mr. G. Bentham.
Secretaries—Dr. Lankester, Prof. J. H. Bennet, Dr. Douglas Maclagan.
Committee—Prof. Allman, Mr. C. C. Babington, Prof. J. H. Balfour, Dr. Black, Mr. G. Busk, Dr. H. Cleghorn, Rev. Prof. Fleming, Mr. W. Gourlie, Rev. L. Jenyns, Dr. W. H. Lowe, Mr. R. MacAndrew, Prof. W. Macdonald, Dr. MacWilliam, Mr. R. Patterson, Rev. J. Reid, Messrs. W. Spence and Wyville Thomson, Prof. Walker-Arnott, Mr. J. Wilson, Dr. P. Neill, Prof. Parlatore, Prof. E. Forbes, Prof. W. Carpenter, Sir W. Jardine, Mr. Hugh E. Strickland, Prof. A. Fleming, Prof. Dickie, Prof. Daubeny, Dr. Redfern, Dr. Tilt, Prof. Owen, Dr. Fowler, Mr. R. Strachey, Prof. Van der Hoeven, Mr. J. E. Winterbottom, Prof. Hyrtl, Messrs. T. C. Eyton, P. J. Selby, Prof. Buchanan, Prof. Sharpey, Mr. C. W. Peach, Dr. D. Mackay, Messrs. Joshua Clark, Hamlyn Lee, Dr. George Johnston.

C. C. Babington, Esq., in the name of Prof. Parlatore, of Florence, who was then attending the Meeting of the Association, presented two works,—one 'On the Vegetation of Mont Blanc and the Great St. Bernard,'—the other the 'First Volume of an Italian Flora, arranged according to the Natural System, and embracing a Description of the Grasses.'

'On the Hedge Plants of India, and the Conditions which adapt them for Special Purposes and Particular Localities,' by Dr. Cleghorn.—The author first made some remarks on the low condition of agriculture generally throughout India, and stated that his remarks more particularly applied to the south of that continent, in the district of Mysore. Having referred to the importance of hedges in any well-developed system of agriculture, he pointed out their especial importance in a country infested with wild animals, and where the crops needed especial protection. He stated, however, that those plants alone could be used for hedges which were adapted to the particular soil and climate where they were employed. Sandy districts produced a very different vegetation from that which is found in a rich alluvial soil. The following plants were named as those which might be used with advantage for hedges in various parts of India. Most of these plants are characterized by possessing spires, prickles and thorns, which render them dangerous to animals. *Opuntia Dillenii.* This plant was originally introduced from America, but grew very abundantly, was easily propagated, and required little or no soil. It might be used for military defences. Its fruit is eaten. It, however, harbours vermin, and is to be used only when other plants cannot be obtained.—*Agave Americana,* another introduced plant. It is propagated by suckers, grows easily, and when decayed the leaves may be used as fuel.—*Euphorbia antiquorum.* This, combined with other species of Euphorbia, forms an excellent fence. Its juice is very acrid, and care must be taken in pruning it. Several species of plants belonging to the divisions Mimoseæ and Cæsalpinieæ, were also mentioned as thorny shrubs adapted for the purposes of inclosure. Many of these have elegant flowers.—*Acacia Arabica* yields gum, and the pods and seeds are eaten. They are all plants easily cultivated.—The Bamboo (*Bambusa arundinacea*) is also a plant highly recommended for forming inclosures. Several other species of Bambusa have been employed for the same purpose.—Other plants used for hedges are *Pandanus odoratissimus,* the lime, the mulberry, species of Hibiscus, &c. The paper was illustrated by drawings of the species of plants described by the author.

Dr. Royle observed that the name of the author's paper was too modest for its comprehensive treatment of the details of the distribution of plants mentioned by the author. It was of the utmost importance in all attempts at cultivating plants in foreign climates that the adaptation of one to the other should be consulted. The plants of the rich alluvial soils in India would not grow in sandy deserts, and *vice versâ.* Frequently, an introduced plant was of more value than an indigenous one; as was remarkably exemplified in several of the species mentioned by Dr. Cleghorn. Some doubt existed about introduced plants in India because they had ancient Sanscrit names; but it frequently happened that the Hindoo gave an old name to a new plant.

'On Exuviation, or, the Changes of Integuments by Animals,' by Sir J. G. Dalyell.—The observations of the writer were confined to the family of Crustacea. He described minutely the changes undergone by crabs during the process of moulting, and, in several instances, counted the number of days from one moult to another. These varied from 60 to 194 days. In all cases he found that no reparation of wounded, mutilated, or destroyed parts took place till after the moult which succeeded the injury. He described minutely several cases in which injuries of various kinds had been repaired. In one case of the moult of a crab only the two claws of the dermal skeleton were developed, whilst the eight legs were entirely suppressed. At the next moult the animal produced its usual number of legs.

Prof. Owen wished to express the obligations under which naturalists were to Sir J. Dalyell for his numerous observations in natural history. The subject of the present paper was one of great interest and demanded further investigation.—Prof. Van der Hoeven stated that the remarks of Sir John confirmed those of Mr. Newport on the change of skin and the reproduction of lost members in the family of spiders.—Mr. Peach said that the white colour of the young crabs mentioned by Sir John was owing to confinement. He believed that limbs were only reproduced after exuviation, from his own observations. Amongst the Crustacea which he had observed, the hermit crabs shed their skin most frequently:—sometimes as often as five or six times in a month.

'Notes on Crustacea,' accompanied by drawings, by Dr. T. Williams.—The notes were, first,—on the developement of the shell. Under this head the author gave an account of the changes observed in the shell during its growth under the microscope. In the first place a production of cells was observed over the region of the heart. This gradually spread and formed the upper layer of the dermal skeleton. Under this was formed a layer of pigment cells, and below this again layers of smaller cells till the whole integument was formed. The younger the animal the oftener this process went on,—till at last it went on very slowly or ceased altogether. Second,—the shedding of the exuviæ. This process seemed in a great measure under the control of the animal; as when watched it frequently suspended this operation, or when excited, hastened it. It seems to be attended with excitement of the nervous system,—as at this period the animal was more pugnacious than at any other. Third,—the reproduction of limbs. This process only took place after the exuviation of the old skin, although a reparative process was evidently set up in the injured part. At the moult immediately subsequent to the loss of a limb, the new limb was not so large as those which represented uninjured limbs.

'Notice of the Distribution of the Herbaria of the Honourable East India Company,' by Dr. Royle.—The collections in the possession of the Company consisted of the plants collected by Royle, Griffiths, Falconer, Harris, Stocks, and others. Duplicates of the specimens contained in these collections had been sent to various public bodies.

Prof. Walker-Arnott complained that although public bodies had been presented with these plants, private individuals who were much more likely to use them had been overlooked.—Prof. Balfour expressed his thanks to the Hon. East India Company for their munificent gift to the University of Edinburgh.—Dr. Royle stated that in the distribution of their Herbaria, the East India Company had supposed that the plants were most likely to be useful in institutions to which all had access.

'On the Anatomy of Doris,' by A. Hancock and Dr. Embleton.—The paper contained a description of the different internal organs and embraced several new points, namely:—Some hitherto unnoticed modifications of the digestive organs. A full account of the complicated organs of reproduction and their varieties:—these organs have long been matter of dispute. A notice of an additional heart having a portal character, and driving along its artery, whose branches form a net-work with the hepatic twigs of the aorta, venous blood,—thus a mixed current is sent to the liver for the secretion of the bile. A description of a renal organ, on the walls of which the net-work of aortic and portal vessels is spread out before they reach the liver. A new version of the course of the circulation of the blood in these mollusks, showing that the blood which is returned from the liver-mass, *i. e.* liver, renal organ and ovarium, is the only portion of that fluid that traverses the branchiæ before reaching the heart, the rest being returned from the other viscera and the skin directly to the auricle, and there mixed with that which has passed through the branchiæ. Lastly, an account of a true sympathetic nervous system in Doris and other mollusks, consisting of plexuses of nerves and ganglia on all the viscera,—a system quite analogous to that of the higher animals. Thus it appeared that the œsophageal circle of ganglia corresponds to the cerebro-spinal nervous system of the vertebrata. The individual ganglia of the mollusk were then compared to their counterparts in the vertebrate cerebro-spinal axis, so as to bring out their true signification. From the whole paper it was evident that the mollusca are much more highly organized than has been supposed, and that as regards the organs of vegetative life, at least much more richly endowed than the articulata have yet been shown to be.

Prof. Macdonald would offer his opposition to the views of the authors if they intended to convey the notion that the œsophageal ganglia in the mollusca were not the representatives of the cerebro-spinal axis.—Dr. Carpenter explained that the last speaker had entirely misapprehended the purport of the remarks made by the authors of the paper. There was no doubt that the infra and supra œsophageal ganglia were the representation of the cerebro-spinal axis, but as to what parts of the cerebrum were represented in the mollusca it was still difficult to say.—Prof. Goodsir congratulated the Meeting on having so valuable a paper as this brought before it. The anatomy of Doris was one of great difficulty on account of the intricate and condensed structure of the creature. Cuvier's dissection of this animal could not be relied on. The observations of the authors on the nervous system of these animals were highly important and novel.—Prof. Van der Hœven could not allow the opportunity to pass without expressing his sense of the importance of this paper and its value as a contribution to physiological science.

'On the Vertebral Homologies of the Basicranium,' by Prof. W. Macdonald.

'Remarks on the *Anacharis Alsinastrum,*' by C. C. Babington,—who exhibited specimens.—The plant was gathered in a river in Berwickshire where it had been seen by Dr. Johnston ten years ago. It was not, however, till recently that it had been recognized as a British plant. It appears now to be very generally diffused,—and where once introduced, to grow with the greatest possible rapidity. In some places where it had not been introduced more than two years it had already quite filled up the reservoirs or parts of canals in which it was growing. A species of Anacharis grew in North America; but Mr. Babington considered the British species peculiar, and had named it accordingly. It belonged to the same order of plants as Vallisneria, and produced its flowers in the same way. Although filaments had

been seen in the staminiferous flowers, no anthers had yet been discovered in the British species.

SECTION F.—STATISTICS.

President—Dr. J. LEE.
Vice-Presidents—Rev. Dr. GORDON, Dr. H. MARSHALL, Prof. W. P. ALISON, Mr. G. B. PORTER.
Secretaries—Prof. HANCOCK, Messrs. J. STARK, J. FLETCHER.
Committee—Mr. T. Tooke, Col. Sykes, Sir J. P. Boileau, Messrs. F. G. P. Neison, G. L. Finlay, W. T. Thomson, J. Finlaison, F. Sopwith, W. Jordan, W. Felkin, J. Shuttleworth, R. Christie, W. Chambers, Sir C. Lemon, Messrs. J. Gibson, J. W. Orpen, J. Ball.

'On the Self-imposed Taxation of the Working Classes in the United Kingdom,' by Mr. G. R. PORTER.—The writer referred, of course, to that self-imposed taxation which consists in the use of articles from which we could very well abstain, which are of little or no use to us either bodily or intellectually, and by foregoing the consumption of which we should become, individually and nationally, better able to bear the necessary expenses of Government. The particular instances to which he called attention were the consumption of ardent spirits, beer and tobacco; the yearly expenditure for which articles in the United Kingdom amounts to a sum which must appear perfectly fabulous until the reasonableness of the result be shown by means of calculations adopted and formed on good authority. The quantity of spirits of home production consumed in 1849 within the kingdom was—

In England	9,053,676	imperial gallons.
Scotland	6,935,003	,,
Ireland	6,973,333	,,
Together	22,962,012	,,

—the duty upon which quantity amounted to 5,793,381*l.* The wholesale cost, including the duty, would probably amount to about 8,000,000*l.*, a sum which would, however, be very far short of that paid by the consumers. In all trades which, like that of the distillation of spirits, are carried on for the supplying of very numerous customers, and where the sum paid at any one time by each individual is very small, the retail profits must necessarily be great, in order to reimburse the expenses attendant on the trade, and to afford a living to those engaged in it. It may likewise be fairly assumed, that something greater than the average rate of profit would be required in order to induce persons with the necessary capital to embark in a business accompanied by, or at least liable to, circumstances of an unpleasant character. It is not possible to make any precise calculations of those expenses and profits; but a good deal of trouble has been taken in order to make as near an approximation as possible to the truth, and it has been given as the opinion of several distillers who have been consulted, that the consumer pays for every gallon of spirits used three times the amount of the duty. Assuming this estimate, it would appear that the cost of British and Irish distilled spirits to the people of England, Scotland and Ireland respectively, in 1849, was 17,381,643*l.*, thus divided:—

England	£8,838,768
Scotland	5,369,868
Ireland	3,173,007
	£17,381,643

To this must be added the sum spent for rum, nearly the whole of which is used by the same classes as consume the gin and whiskey, of which the cost is here estimated. The consumption of rum in 1849 amounted to 3,044,758 imperial gallons, the duty paid on which was 1,142,855*l.* The class of consumers being the same, and the means of distribution nearly if not wholly identical, it may fairly be assumed that the cost to the consumer bears an equal relation to the duty with that assigned to British spirits, in which case the expenditure for this kind of spirit will reach 3,428,565*l.*, making the whole outlay of the people for these two descriptions of ardent spirits 20,810,208*l.*, thus locally divided—

England	£8,205,342
Scotland	6,285,114
Ireland	6,319,852
	£20,810,208

If, for the purpose of the calculation, we assume that the population of the three divisions of the United Kingdom was the same in 1849 as it was found to be at the enumeration of 1841, the consumption per head in the year was—

In England	0·569	gallons.
Scotland	2·647	,,
Ireland	0·853	,,

These proportions are such as would fall to the share of each man, woman and child throughout the land; but it must be evident that many, and especially the women and children, can count for very little in the calculation, if indeed they should not be wholly discarded from it. Adopting this latter view, and dividing the quantity consumed among the adult males in all ranks of life, as they were ascertained in 1841, the following portions would fall to the share of each—

In England	2·330	gallons, or about	2½ gallons.
Scotland	11·168	,, ,,	11½ ,,
Ireland	3·469	,, ,,	3½ ,,

Brandy is for the most part drunk by persons not of the working class, as that term is generally, but somewhat arbitrarily, understood. The quantity consumed in 1849 was 2,187,500 imperial gallons,—

The first or wholesale cost of which was about	£546,875
And the duty paid amounted to	1,640,282
Together	£2,187,157

The system of distribution is, for the most part, quite different from that used with respect to British and colonial spirits,—a large proportion being purchased in quantities of two gallons and upwards for use in private families, so that a much smaller rate of gross profit will be required by the dealers. Some part is, however, sold at inns and public houses by the glass, and for this portion a very high profit will be received, so that it cannot be considered an overestimate if we assume that each gallon costs, on the average, to the consumers, 30*s.* or 50*s.* per cent. advance upon the import cost and duty. This would exhibit an expenditure for brandy of 3,281,250*l.*, which, added to the sum formerly stated, gives a total expenditure within the year for ardent spirits of the enormous sum of 24,091,458*l.* The data at command by means of which to estimate the money spent for beer in its various forms, is not so satisfactory as that used in regard to spirits, but is sufficiently precise to enable us to approximate to the truth within a reasonable degree of accuracy. The number of bushels of malt subjected to duty in 1849 was 37,999,032, or 4,749,879 quarters, but of this quantity only 3,719,145 quarters is set down as having been used by licensed brewers. Of the remaining 1,030,734 quarters, the greater part was, no doubt, used by private families, and the remainder was worked up by the distillers. In order to be on the side of moderation, let us assume that only the quantity (3,719,145 quarters) used in licensed breweries was employed in making beer, and we shall find, upon the usual calculation of 3¼ barrels of beer, of average quality and strength, as the product of each quarter of malt, that the number of gallons brewed from the above-mentioned quantity was 435,139,965. The price at which porter is retailed to the consumer varies with the circumstances attending the sale. When it is taken away in the jugs of the buyers for consumption elsewhere, the charge is 3*d.* per quart, or 1*s.* per gallon, but when drunk on the premises of the seller, the charge is one-third more—viz. 4*d.* per quart, or 1*s.* 4*d.* per gallon; a difference of price which, considering the check upon exorbitant profits offered by the great amount of competition among the sellers, affords good evidence of the necessity for a large advance upon the actual cost in order to meet and cover the expenses of retail dealers. The prices here mentioned are for porter. Ale is higher in price, and is retailed at 4*d.*, 6*d.* or 8*d.* per quart, according to its quality, which mainly depends upon the proportion of malt and hops used in its production. On the other hand, table-beer, which is very largely drunk in families, is frequently sold at a lower price than 1*s.* per gallon, but in such cases a smaller or a larger quantity is produced from a like quantity of ingredients. As no means can be found for determining the quantities of each kind and quality of beer consumed, let it be assumed, as very fairly it may be, that taking all qualities into the account, the price to the consumer is a mean between the two prices above stated for porter—viz., 1*s.* 2*d.* per gallon, and we arrive at the sum of 25,383,165*l.* annually spent by the population of this kingdom, and chiefly by the labouring portion, for beer. It is shown by a statement recently presented to the House of Commons, that the number of persons who are engaged as producers and distributors of beer in England and Wales, is as follows:—

Brewers	2,507
Victuallers	88,496
Persons licensed to keep beer-houses	38,070
	129,073

The quantity of manufactured tobacco upon which duty was paid in 1849 was 27,480,621 lb., and of manufactured tobacco and snuff 205,066 lb., yielding a revenue of 4,408,017*l.* 14*s.* 11*d.* The retail price ranges from 4*s.* to 14*s.* per lb., 17-20ths, or 85 per cent., of the whole being of the lowest price here named, and only about 2 per cent. being of the highest quality, proportions which were stated by several respectable manufacturers who gave evidence before a committee of the House of Commons in 1845. On the same authority we are told that an addition is made of other ingredients in the processes of manufacture, amounting to 15 per cent. upon the 85 per cent., which consists of cut or shag, and roll tobacco, while the snuff, which comprises 13 out of 15 parts of the remainder, admits of an increased weight to the extent of from 50 to 60 per cent. Applying these per-centages to the quantity taken for consumption in 1849, we arrive at the following results:—

	Pr. ct.	Lb.		Pr. ct.	Lb.
Shag and roll tobac.	85	23,358,529	adding increase	15	26,863,308
Snuff of var. kinds,	13	3,572,480	increase	55	5,537,344
Segars	2	549,612	no increase		549,612
		Lb. 27,480,621			Lb. 32,949,964
Manufactured when imported					205,066
So that the quantity for which the public pays as tobacco and snuff is					Lb. 33,154,330

The retail prices, obtained from a respectable shop in a leading thoroughfare in London, at this time (June 1850) are:—

	Per oz.		Per oz.
Good Shag	3*d.*	Princes' Mixture	6*d.*
Best do.	3½*d.*	Brown Rappee	4½*d.*
Bird's Eye	3½*d.*	Pale Scotch	4*d.*
Returns	3½*d.*	Do. best	4½*d.*
Cavendish	4*d.*	Black Rappee	4*d.*
K'naster	6*d.*		

The average price of the six qualities of tobacco here given is at the rate of 5*s.* 2*d.* per lb., and that of the five qualities of snuff is 7*s.* 6*d.* per lb. The great bulk of the consumption falls upon the lowest priced quality of tobacco, which is 3*d.* per oz. or 4*s.* per lb. It cannot, therefore, give an exaggerated view of the sum expended for this article if we assume that lowest price as being paid for the whole. In regard to snuff a larger proportion of the whole than in the case of tobacco is used by the middling and easy classes, to whom the difference of a penny in the price of an ounce of snuff cannot be any object, and who rarely, if ever, will buy the most inferior quality. The prices, it will be seen, run from 5*s.* 4*d.* to 8*s.* per lb.; if we take the mean of these two prices as the average of the whole, *i.e.* 6*s.* 8*d.* per lb. we shall probably be within the mark. At these rates, the cost to the consumers generally will be as follows:—

26,862,308 lb. of tobacco at 4*s.* per lb.	£5,372,461
5,537,344 lb. snuff at 6*s.* 8*d.*	1,845,781
549,612 lb. English-made segars at 9*s.*	247,325
Total for British-manufactured	£7,465,567
205,066 foreign-manufactured at 12*s.*	123,040
Total value as paid by consumers	£7,588,607

which amount would yield 50 per cent. above the cost of the tobacco as imported, and the duty paid thereon,—a moderate increase to defray all the expenses of manufacture, and the charges attendant upon the retailing of an article nearly the whole of which is paid for in copper coins. There can be no reason to suspect that the amount can be at all overcharged, which leaves no larger margin than this for the gross profits of 209,537 persons the number which, in the year 1848, took out and paid for licences to deal in tobacco and snuff, in addition to 642 persons licenced to manufacture those articles. It must be remembered, that with regard to two of the three articles the expenditure for which Mr. Porter had endeavoured to estimate, an indefinite sum should be allowed for the quantities illictly produced and imported, but as to the amount of which it is altogether impossible to form any trustworthy estimate. We know, however, from the seizures and discoveries that are continually made, that a very large additional amount must be drawn from the pockets of the people in order to compensate for the risks of the smuggler and the illicit distiller.

If it be conceded that the sums here brought forward

are justified by the facts and calculations on which they are based, it would appear, that the people, and chiefly the working classes of England, Scotland, and Ireland, voluntarily tax themselves for the enjoyment of only three articles, neither of which is of any absolute necessity, to the following amount.—

British and Colonial spirits	£20,810,208
Brandy	3,281,250
Total of spirits	£24,091,458
Beer of all kinds, exclusive of that brewed in private families	£25,383,165
Tobacco and Snuff	7,588,607
	£57,063,230

At the beginning of this paper it was remarked, that the amount of money expended upon articles which, like spirits, beer and tobacco, are not of first necessity, forms a measure of the prosperity of the nation and of the ability of the community to bear those national burthens which cannot be avoided,—a remark the justice of which hardly admits of question; but it would by no means follow that the diminished use of the three articles named would afford proof in itself of lessened means of comfort on the part of the working people, and of diminished prosperity in the nation generally. On the contrary, if it were seen that, as respects gin and whiskey, the two and one-third gallons consumed in the year in England—the eleven and one-sixth gallons so consumed in Scotland—and the three and a-half gallons consumed in Ireland, by each adult male, were diminished to one-half those proportions, while a larger sale should be effected of sugar, of tea, of articles of decent clothing, and of other matters whereof the females and children should be partakers, there can be no disputing about the advantageous nature of the change, and but little ground for asserting that the general sum of prosperity were lessened. The probability, on the contrary, is, that money thus expended would afford greater means for employment throughout the country in other branches of industry, and thus open additional sources of prosperity to all. There is one consideration arising out of this view of the subject which is of a painful character, and which, if it were hopeless of cure, would be most disheartening to all who desire that the moral progress of the people should advance at least at an equal pace with their physical progress— it is, that among the working classes so very large a portion of the earnings of the male head of the family is devoted by him to his personal and sensual gratifications. It has been computed that, among those whose earnings are from 10*s.* to 15*s.* weekly at least one-half is spent by the man upon objects in which the other members of the family have no share. Among artisans, earning from 20*s.* to 30*s.* weekly, it is said that at least one-third of the amount is in many cases thus selfishly devoted. That this state of things need not be, and that, if the people generally were better instructed as regards their social duties, it would not be, may safely be inferred from the fact that it is rarely, if ever, found to exist in the numerous cases where earnings not greater than those of the artisan class are all that are gained by the head of the family when employed upon matters where education is necessary. Take even the case of a clerk, with a salary of 80*l.* a-year, a small fraction beyond 30*s.* a-week, and it would be considered quite exceptional if it were found that anything approaching to a fourth part of the earnings were spent upon objects in which the wife and children should have no share. The peer, the merchant, the clerk, the artisan, and the labourer, are all of the same nature, born with the same propensities and subject to the like influences. It is true they are placed in very different circumstances—the chief difference being that of their early training—one, happily, which it is quite possible in some degree to remedy, and that by means which would in many ways add to the sum of the nation's prosperity and respectability.

'On the Cost of obtaining Patents in different Countries,' by Prof. Hancock.—He proposed to direct attention to a table showing the cost of obtaining patents in different countries. The principal points in the table worth noticing were:—1st, That the cost of obtaining copyright for designs, under recent legislation, was from 1*l.* to 15*l.*, being less than in any country in the world. 2nd, That the cost of obtaining a patent in England was 110*l.*, being greater than in any other European state. 3rd, That the cost of obtaining a patent in Ireland was 135*l.*, being greater than in any other country in the world. 4th, That the cost of obtaining a patent for the entire British dominions was 375*l.*, being three times the cost of a similar privilege in any other collection of territories under one government in the world. He then proceeded to inquire whether there was any good reason for maintaining the great cost of obtaining patents in Great Britain; and proposed the following questions for consideration:—1st, Should separate patents be required for each portion of the United Kingdom? 2nd, Was the expense of English patents caused by wise arrangements, for affording to the public facilities for searching for previous inventions? 3rd, Was the great expense of British patents caused by arrangements for affording security to the inventor in the enjoyment of his property? 4th, From what causes did the cost of British patents arise? 5th, What were the benefits which patents of invention conferred on the community? 6th, By what means could the cost of obtaining British patents be diminished? He showed that if the system of having one registration for the United Kingdom, like that for registration of designs, were extended to patents, the cost of obtaining patents would be at once reduced from 376*l.* to 110*l.*,—that the cost of obtaining patents in Great Britain did not arise from arrangements for affording to the public facilities for searching for previous inventions, nor for affording security to the inventor. He then proceeded to point out the causes of the great cost of British patents to be—1st, The prolix and complicated forms of procedure for obtaining patents. 2nd, The fees to the Attorney General and other public officers on these forms of procedure. 3rd, The stamp duties on patents and on the specifications required from patentees. It seemed very unwise to require the intervention of a Master in Chancery, a Secretary of State, an Attorney General, and a Lord Chancellor to the issue of a document that was a simple certificate of registration. The system of paying public officers by salaries instead of fees had been generally recognized, but not extended to the case of patents. The tax on patents was unequal, being the same no matter what was the value of the invention. The tax was also imposed at the time most inconvenient for the inventor to pay, namely, before he had derived any profit from his invention. The benefits arising from the granting of patents were threefold:—1st, securing a reward to the inventor; 2nd, securing to the public a disclosure of the process used; and 3rd, encouraging the inventive genius of the community by forcing inventors to make really new discoveries. The means of reducing the cost of obtaining patents were threefold:—1st, By having only one patent for the United Kingdom. 2nd, By adopting for all inventions the simple process of granting certificates of registration of designs, instead of the prolix and complicated forms now required in obtaining patents. 3rd, By substituting for all inventions the moderate fees and stamps on the registration of designs for the official fees and stamps or patents.

A discussion followed, in which Mr. W. Chambers, Mr. Porter, Mr. Nash, Mr. Gibson, Mr. Newall, Col. Sykes, Mr. Filkin, and Mr. Simpson took part.

'On the Causes of Distress at Skull and Skibbereen during the Famine in Ireland,' by Prof. Hancock.—This district suffered more than any other during the famine in Ireland. Was the distress entirely caused by the potato failure? This depended on the question, What was the state of the Skibbereen district before 1846? The *Times* Commissioner had visited it in 1845, and described the people as being then in the most abject state of destitution. Hence it followed that the real sources of the calamities which the people suffered were the distress and wretched system of agriculture which prevailed before the famine. Had the people not been reduced to the verge of starvation,—had their wages not been at the lowest point consistent with human existence before that time,—the failure of the potato would, as in other districts, have caused privation only, and not death. The next inquiry was, To what causes are the wretched agriculture and consequent distress before 1845 to be ascribed? To solve this question, Mr. Mill had started the theory that peasant-rents fixed by competition was the foundation of the economic evils of Ireland. He proposed to test Mr. Mill's theory, and to contrast with the conclusions to which he had been led, that the state of the law respecting land was the cause of distress. The facts respecting this district he had collected from a petition in the case of the late Lord Audley, in the Incumbered Estates Court. The Audley estate included a large tract of land lying between Skull and Skibbereen. The entire of this estate was held by a middleman, whose lease would expire in 1854, so that in 1845 and 1846 no occupier had any interest exceeding nine years in the land;—so that neither middleman nor occupiers were able to improve the estate. As to interest of the head landlord, it appeared that as far back as 1829 the incumbrances on the Audley estate had far exceeded its value, being 25,000*l.* on a rental of less than 600*l.* a-year. That they increased rapidly, so as to amount to 89,400*l.*, exclusive of interest and law costs, at Lord Audley's death in 1837. That the interest and law costs increased the charges against the property in 1846 to the enormous amount of 167,300*l.*, on a rental of 577*l.* a year. It appeared that from Lord Audley's death, in 1837, to the present hour, instead of there being one landlord to deal with the property, there were eighty incumbrancers, whose consent was necessary to enable anything being done. Hence the folly of speaking of competition in such a case when this state of the property rendered real competition impossible. The economic evils of Ireland, in his opinion, did not arise from peasant rents fixed by competition, and consequently those evils could be removed by having peasant rents fixed by law. Of those causes that were within human control, the chief cause of distress in Ireland, he thought, was the state of the law with regard to land. The laws respecting property in land, he stated, were defective in these particulars:—1st, in opposing impediments to the free sale of land, and encouraging instead terminable leases; 2nd, in denying security to the capital of tenants, by providing that, in the absence of contracts, improvements shall not belong to the improver; 3rd, in impeding the search for incumbrances, by maintaining a complicated and defective system of registration of debts and charges affecting land; and 4th, in the want of simple, cheap and expeditious forms of procedure for the enforcement of debts and contracts affecting land.

FRIDAY.

'An Inquiry into the question, whether, under our existing social system, there is a Tendency for the Increasing of Capital in the hands of those already possessing Riches?' by Mr. G. R. Porter.—The sources of information bearing upon this interesting social question which are open to us are not many. An examination of the amount of Savings Banks will show that the deposits in England, Wales and Ireland, proportioned to the population, amounted in 1831 to 12*s.* 8*d.* per head; in 1836 to 16*s.* 4*d.*; in 1841 to 19*s.* 10*d.*; and in 1848 to 20*s.* 11*d.* In Scotland the deposits were—in 1836, 7*d.* per head; 1841, 4*s.* 8*d.*; 1848, 7*s.* 5*d.* The largest amount of these savings occurred in 1846, when they reached in England to 26,759,817*l.*; Wales, 674,657*l.*; Scotland, 1,383,866*l.*; Ireland, 2,924,910*l.*; in all, 31,743,250*l.*; being equal to 24*s.* per head on the population of England, Wales and Ireland, and 10*s.* 1*d.* per head on that of Scotland. The diminution in 1847 and 1848 is clearly the result of the high prices of provisions, and consequent falling off in wages caused by the potato rot and its attendant circumstances. The comparative smallness of the deposits in Scotland arises from two causes: first, the system of allowing interest upon very small sums deposited in private and joint-stock banks; and secondly, the more recent connexion of savings banks with the Government in that division of the kingdom. There is no reason for supposing that the labouring classes of Scotland are less saving than those of England or Ireland; and, presuming that the disposition to save is naturally as great in each part of the kingdom, the workmen of Scotland have until very recently had a much stronger incentive than their English fellow-subjects to set aside a part of their

earnings, because of the absence of any legal provision for the wants of their old age, and against the occurrence of sickness or accident. The next test to which I would direct attention varies essentially from that afforded by the progress of savings banks; inasmuch as it excludes all evidence of actual saving or accumulation, while it offers a strictly comparative view of such saving as between different classes of the community. The accounts furnished to Parliament of the number of persons entitled to dividends upon portions of the public debt, divide the fundholders into ten classes, according to the amount of which they are so entitled. Mr. Porter here contrasts by tables the numbers in each class as they stood on the 5th of April and 5th of July of the years 1831 and 1848 respectively; and he then goes on to say, that it will be seen that there has been a very large addition between 1831 and 1848 to the number of persons receiving under 5*l.* at each payment of dividends, and a small increase upon the number receiving between 5*l.* and 10*l.*, while, with the exception of the largest holders—those whose dividends exceed 2,000*l.* at each payment, and of whom there has been an increase of five—every other class has experienced a considerable decrease in its numbers. That there has been a diminution of more than 8 per cent. in the numbers receiving between 300*l.* and 500*l.*; of 12½ per cent. of those receiving between 500*l.* and 1,000*l.*, and of more than 20 per cent. among holders of stock yielding dividends between 1,000*l.* and 2,000*l.*, would seem conclusively to show, that at least as respects this mode of disposing of accumulations, there is not any reason to believe that the already rich are acquiring greater wealth at the expense of the rest of the community. The branch of this inquiry to which my attention was next directed, was that elucidated by returns showing the sums assessed to the Income-tax in respect of incomes derived from trades and professions in 1812, compared with the like returns in 1848, excluding from the former period the incomes below 150*l.*, which, under the existing law, are allowed to pass untaxed. The total amount thus assessed, after deducting exemptions, was in 1812, 21,247,621*l.*; while in 1848 the amount was 56,990,224*l.*; showing an increase in 36 years of 35,742,602*l.*, or 168·21 per cent., being at the rate of 4·67 per cent. yearly, an increase very near threefold greater than the increase during the same period of the population of that part of the United Kingdom which is subject to the Income-tax. The object now in view is not that of showing the increased wealth of the country at large, but in what degree such increase has been experienced among different classes of the people, or occasion might be taken to express the satisfaction which every Englishman must feel at this unmistakeable evidence of the well-being and continued progress of our country; which feeling is shown by the results to which I thus venture upon calling attention to be unalloyed by any well-founded fears concerning the oft-alleged deteriorated condition of the bulk of the people. The returns examined give the sums assessed to Income-tax in various classes, and for the purpose of the present examination I have distinguished the incomes thus given between 150*l.* and 500*l.*; between 500*l.* and 1,000*l.*; between 1,000*l.* and 2,000*l.*; between 2,000*l.* and 5,000*l.*; and above 5,000*l.*—Between 150*l.* and 500*l.* per annum, I find a positive increase in 1848 of 13,724,949*l.* upon the incomes assessed in 1812. Between 500*l.* and 1,000*l.* per annum, the increase since 1812 has been 5,100,540*l.* On incomes between 1,000*l.* and 2,000*l.* the increase has amounted to 4,078,095*l.* In incomes between 2,000*l.* and 5,000*l.* there is an increase of 4,059,743; while in the highest class, which includes all incomes above 5,000*l.* per annum, the increase is found to be 8,779,275*l.* Comparing the lowest with the highest of those classes, it is shown that the increase has been greater in the lowest class by 4,945,674*l.* or 56·33 per cent. The only remaining documents bearing an official character to which recourse can be had in order to throw light upon this subject, are the returns made from the office of the Commissioners for Inland Revenue, showing the sums upon which probate duty has been paid in respect of personal property left by persons deceased. Stated at intervals of five years, beginning with the present century, it has been as follows:—

1801	£3,541,931	1826	£31,024,593
1806	7,039,031	1831	39,532,397
1811	14,757,420	1836	41,768,806
1816	24,073,456	1841	41,476,521
1821	33,028,060	1848	44,348,721

After making a liberal allowance for evasion of the tax in the early years following its first imposition in 1797, and for the collection of arrears in 1848, the increase, during less than half a century, of property thus brought under the operation of the probate duty is such as must strike us with astonishment. Our present business, however, is with the comparative amount of estates in different classes, for which purpose a calculation has been made of their value in 1833, the earliest year for which the returns enabled us to make the same, and in 1848. Dividing the sixteen years from 1833 to 1848 into equal periods of four years each, and ascertaining the average duty paid in each year of such division, it appears that the sum received in the four years—

1833 to 1836	averaged	£238,306
1837 to 1840	—	230,388
1841 to 1844	—	229,162
1845 to 1848	—	225,962

while the average receipts from the probate duty generally has been steadily and progressively advancing with the increasing wealth of the country. Having examined all the official returns which afford means for arriving at the truth upon this really important subject, we observe the most perfect agreement in their results; and it cannot but be satisfactory to every one to find that the fears entertained and expressed by many as to the probable disappearance of the middle classes from among us are unfounded; that it is far from being true that the rich are growing richer and the poor are becoming poorer; but that, on the contrary, those who occupy a middle station (perhaps the safest station as regards personal respectability, and that which offers the surest guarantee for the progress and continued well-being of the country) are progressively increasing in number and in the proportion which they bear relatively to the population of the kingdom.

'On the Relations of Crime and Ignorance in England and Wales,' by Mr. J. Fletcher.—The general result of the criminal returns for 1848 resembles very closely that for the average of the three years 1845-6-7 (being three years of reviving industry), since in these there is a balance of 11·8 per cent. in favour of the districts of most instruction; and in the year 1848 one of 12·7 per cent. The balance in favour of the more educated districts is seen, however, to be greatly augmented in the great northern and midland mining and manufacturing region, and in the northern and north midland agricultural counties bordering upon it; while the favourable balance is lowered in every other. This appears to be attributable to the steadily improving industry of the mining and manufacturing districts of the north; while the comparative poverty and distress among the Cornish mines give a positive balance against that more educated Celtic district, as compared with Wales, of 9·8 per cent. instead of 9·1 per cent. on the opposite side; precisely changing place with the counties of Leicester, Northampton, and Rutland, which show 13·8 per cent. in favourable comparison with Hereford and Salop, instead of 12·2 on the opposite side. Regarded in every light, therefore, whether under industrial or political agitation, the more instructed localities show the most buoyant and favourable character. But the absolute increase upon the year is distressingly great, being 1,516 upon the total commitments, as compared with 1847; 5,242 as compared with 1846; and 6,046 as compared with 1845; the gross commitments of 1848 being 30,349; and the increase since 1845 is, therefore, of no less than 25 per cent. in the face of improving industry. Public opinion appears certainly to have effected a change, which it is hoped will prove salutary in the proportion of young persons under fifteen years of age committed for trial at assizes and quarter sessions in England and Wales, which is seen to have suddenly declined nearly one-half from 6·1 to 3·6 per cent.

A discussion took place on the subject of this paper, which was participated in by Col. Sykes, Mr. G. R. Porter, Mr. F. G. Neison, and Prof. Hancock.—Col. Sykes said he hoped they would guard against assuming that an increase of crime was necessarily and entirely to be attributed to defective education, for, in his opinion, there were many other elements to be considered.

'On the Civil and Criminal Justice of the North-west Provinces of British India,' by Col. Sykes.—The tendency of the Colonel's paper went to show the propriety of native judges being appointed, whose decisions gave greater satisfaction to the natives than those of the judges from this country.

THURSDAY.

Section G.—Mechanical Science.

President—Rev. Dr. Robinson.
Vice-Presidents—Mr. G. Buchanan, Prof. Gordon, Messrs. T. Grainger, J. Scott Russell.
Secretaries—Dr. Lees, Mr. D. Stevenson.
Committee—Messrs. J. Taylor, J. Nasmyth, R. Napier, — Roberts, J. Leslie, Prof. Fischer, Major-Gen. Pasley, Mr. T. Stevenson.

The President opened the meeting by an exposition of the peculiar objects of this Section, and its relation to the other Sections of the Association. Originally this Section was merely a sub-section of Section A. It was no sooner instituted, than the importance and number of the applications of mathematical and physical science to the practical uses of life, which were brought forward, raised it to an importance which has made it one of the most useful of the Sections of the Association. He believed that some of the most valuable of the measures of the Association had emanated from it, and some of the most important researches had been carried out by means of grants of money recommended by this Section.

Mr. Scott Russell read a Report from Rio Janeiro, which narrated the progress that had been made in the Brazils, within the last six years, in the application of the principles of the Wave System to the practical construction of ships, both of steam vessels and of sailing vessels. Mr. Butler Dodgson is a naval architect, employed in the Parta de Aria Iron Works and Dockyard, an establishment largely engaged for Government in the construction of ships and steam vessels. He had early read the Reports of the British Association which contained an account of the wave system, and had been enabled to construct a number of vessels upon that system, and the present communication showed that he had done so with perfect success. The vessels built on this principle possess not only greater speed than others, but also every other good quality as sea-going vessels. Mr. Butler Dodgson encountered the usual opposition from the interests of rivals and the prejudices of men in office; but having tested and established the value of the principle he is now employed to build large steamers for the Government on that principle.—Dr. Robinson expressed his regret that knowledge of which foreign Governments were thus enabled to avail themselves was not turned to practical account by Government at home. The British Association had made application to the Government of this country to render the researches of Mr. Scott Russell, which had been carried on under the auspices of the Association, available to the public service; but hitherto without success.—A discussion arose regarding the recent applications of the wave principle to the construction of sailing-yacht schooners in England. The Titania had proved herself to be the fastest yacht of her size, and to possess in a high degree the qualities of a sea-going vessel, and she was built on the wave principle.

'On the Hyperbolic Law of the Elasticity of Cast-Iron,' by Mr. Homersham Cox.

'On Improvements in Propelling and Navigating Steam Vessels,' by Mr. Ruthven.—He employs the steam-engine to propel water through two apertures or nozzles in a bent pipe, and by turning these nozzles either forwards or backwards he propels the vessel either way. The water issues near the water line, and he conceives that by this means speed would be obtained without sacrificing the sea-going qualities of a ship.

Dr. Robinson explained, that although progression may be obtained in this way, yet there is reason to suppose that it will be obtained in a manner by no means economical at high velocities.

The meeting closed with a verbal communication from Mr. Nasmyth on his improvements in forging Iron.

Printed by JAMES HOLMES, of No. 4, New Ormond-street, in the county of Middlesex, printer, at his office No. 4, Took's Court, Chancery-lane, in the parish of St. Andrew, in the said county; and published by JOHN FRANCIS, of No. 14, Wellington-street North, in the said county, Publisher, at No. 14, in Wellington-street aforesaid; and sold by all Booksellers and Newsvenders.—Agents, for Scotland, Messrs. Bell & Bradfute, Edinburgh; for Ireland, Mr. John Robertson, Dublin.—Saturday, August 10, 1850.